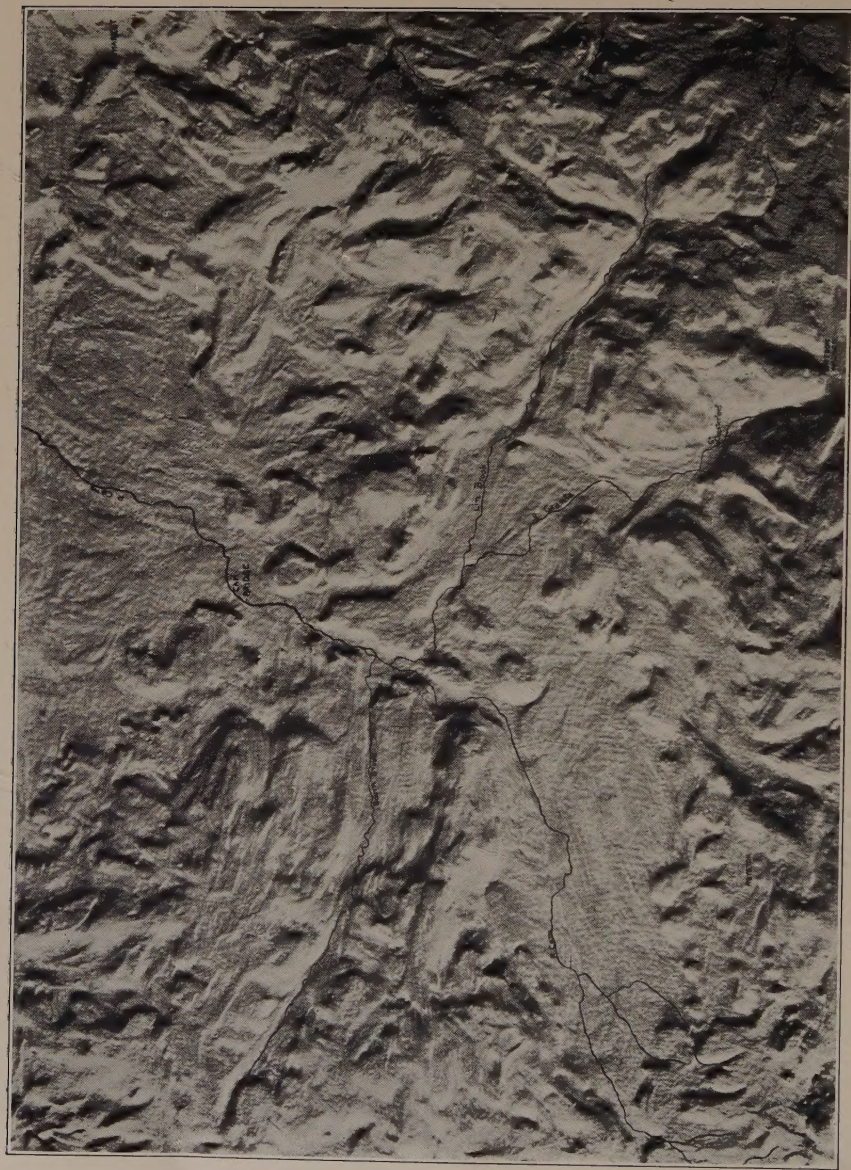


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A HUMAN GEOGRAPHY
OF CAMBRIDGESHIRE



SOUTHERN CAMBRIDGESHIRE.
(Photographed from a Relief Model.)

A HUMAN GEOGRAPHY OF CAMBRIDGESHIRE

A Suggested Method of Studying
and Teaching the Home Area

BY

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PREFACE

THE object of this book is to encourage the closer study of the home area ; to suggest the geographical wealth of an English county ; to show that many principles of geography can be studied in a small area ; and to indicate methods of approach, some of which may be adopted in a class of older children.

In order to illustrate the methods suggested it was necessary to use a definite area, and the county of Cambridgeshire, comprising within its boundaries certain well-marked types of country, forms a suitable area for study. The subject-matter given here forms the basis of a short course of lectures given to students training as elementary teachers ; but it is hoped that the method of treatment adopted will be such as to appeal to readers who are interested in the county for its own sake.

JOHN JONES.

HOMERTON COLLEGE,
CAMBRIDGE,
March, 1924.

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CHAPTER I

GENERAL DESCRIPTION OF THE COUNTY—FENLANDS—DRAINAGE— UPLANDS—NOTES ON METHOD

CAMBRIDGESHIRE, like many other English counties, has a diversity in its structure and relief, that gives rise to a variety in its human geography, which well merits and repays a careful study.

The county is about 50 miles long from north to south, the greatest breadth is 32 miles, and its area is 864 sq. miles. About two-thirds of this area is plain, the remaining one-third we shall call the uplands. The 50-ft. contour can be taken as the boundary between the two regions without being far wrong, and while in one or two small areas the uplands rise to just over 400 ft. above sea-level, their average height can be taken at about 150 ft. Almost all the land below the 50-ft. contour belongs to the Fenland, whose average height above sea-level is only about 15 ft., and this is the reason why the uplands, although of such moderate relief, form

so strong a contrast with the northern part of the county.

To understand and appreciate the occupation of the region by man, and to see how man and nature act and react the one upon the other, it is necessary for us to recognise some of the most important physical characters of these two distinct areas, and to do this we must extend our observations beyond the county boundaries.

The Fens.

The Fenland is a good example of how flat nature can make a land surface. You can traverse it for mile after mile without encountering any rise on the surface that you can possibly call a hill. From Lincoln in the north to Cambridge in the south it is over 70 miles, as the crow flies; and from Brandon in the east to Peterborough in the west it is 36 miles, with

an area of 1300 sq. miles. The total area of the catchment basin of the rivers that flow into the Wash is at least 5800 sq. miles, and so into this fenland, the drainage from an area of 4500 sq. miles flows by sluggish streams that have difficulty in reaching the sea.

Thus in early times this waterlogged and often water-covered land was a barrier between what to-day is Norfolk to the east and the midlands to the west. Almost the whole of the area now has been drained and reclaimed from its natural waste state, but judging by the small area, such as Wicken Fen, which remains undrained, we can form a picture of what the Fenland was before man took it in hand. It would be covered with a water-loving association of plant life—rushes with their roots in the water would grow taller than a man—wild fowl and fish of many kinds would abound, and while it offered a place of refuge to those who knew its streams and meres, it was a desert and an obstacle to any stranger who attempted a crossing.

As there are oases in the dry sandy desert, so there were oases in this desert of fens; but here they are patches of land slightly higher and therefore drier than the land sur-

rounding them—*islands*, in the sea of meres.

These islands were the first points upon which man settled, and as we trace out the occupation of the area we shall see their importance even to-day. It was from these points of vantage that man began his conquest of the fens, which has resulted in the conversion of this fen-waste into a land noted throughout the length and breadth of the country for its fertility.

But whenever man enters into the struggle with nature and seeks to tame her to his own needs, constant care and watchfulness on his part are ever needed. Whether it be by damming a mountain torrent or planting a garden in the sandy desert, by cutting a roadway over the mountain or making a clearing in the forest, by cutting a canal through an isthmus or by draining a marshy plain, he has constantly to be on the alert lest his work should give way before the ever-acting forces of nature. So it has been in the fens. Man has straightened the streams, dug drains and canals, embanked both river and canal with the greatest care, and built large dams and sluice-gates to control the waters, but it has only been by persistence, watchfulness, patience and skill that he has won.

Briefly the process of draining is as follows. The excess of water in the fens is due to two causes : First, the rivers draining into the area overflow their banks after heavy rains, and secondly, the land is so low and so flat that the rain that falls locally cannot drain away. Clearly, then, the first thing to do is to build the banks of the rivers higher so that even at flood time the waters are kept in their own channels. Thus all the natural waterways are embanked. The second thing to do is to cut drains through the fenland into which the local rainfall collects by seepage. These drains are connected by others at right angles to them, and built up to a slightly higher level, into which the water is pumped from the lower ones. These naturally are wider and lead to the rivers to which they are connected through sluice gates. The drains are sometimes named from their breadth, for example, the 16-foot drain (see Wimblington parish, Fig. 9) and the new Bedford River is called the 100-foot, while sometimes they are called " lodes."

When the water in the lode is higher than that in the river the sluice gates are opened, but when the rivers rise the sluice gates are closed. The draining of the land has naturally

caused it to sink, and so the embankments of the rivers in many places are considerably above the level of the surrounding land. Here lies the danger, for should the embankment burst under the increased pressure when the rivers are high, floods occur which do immense damage. So at times of heavy rain a small army of men is employed in patrolling the banks by day and by night for the safety of the fens.

But the fen-men in days of old did more than dig drains. They built bridges, abbeys, cathedrals, in stone brought from a distance, some of which are still standing, but others are in ruins or have disappeared. Lincoln and Peterborough cathedrals on the edge of the fens, and Ely—the city set on a hill in the middle of the fenlands—are monuments of their labour. From the roof of King's Chapel in Cambridge, on a clear day, Ely can be seen on the horizon, 16 miles distant, an expression of the flatness of the fens.

" This great level tract—the largest plain of Britain—is interesting by reason of its magnitude, its almost unbroken flatness and its fertility : because within its bounds important historical and political events have transpired, far-famed institutions of

a by-gone age have flourished and decayed : and because through many ages it has demanded the most strenuous energies of the sturdy men of yore, and in these later times has taxed all the powers and genius of experienced engineers to secure it from the inroads of the watery element. . . . Labour, skill, resolution, capital—these have made the Great Fen what it is to-day—the Golden Plain of England.” *

The Uplands.

Let us now glance at the southern part of the county—the Uplands. Here we are in a different world. There is a nice diversity of hill and valley. Over a great part of it, except when in the valleys, watercourses are few and far between, compared with the northern part of the county ; we have entered for the most part upon a dry, well-drained area, but generally the same sense of broad openness appeals to us.

In some places the land rises fairly steeply from the fens to the downs, short stretches of road with a gradient of 1 in 16 are not uncommon, but cycling on the roads is a great pleasure, the slight undulations breaking the

monotony which strikes one when riding along the almost interminable flat roads of the fens.

The topography of the south of Cambridgeshire is largely due to river erosion ; the rivers have cut valleys into the uplands, broad when parallel to the outcrop, but narrower and steeper when transverse to the chalk strata. No doubt, in early days, both the valley floors and the crests of the uplands were well wooded, traces are still to be seen, but the chalk escarpment, between the valley and the crest, was more open, grassy land, quickly drying after heavy rains, and forming a way along which in ancient days men were accustomed to move. But most of this land has been brought under the plough, and it is only in such places as Newmarket Heath and Royston Heath that we can get the picture of what so much of the uplands must have been in early days, before man began his conquest of the chalk lands. A heath in Cambridgeshire means an open grassy space. The two heaths mentioned are just on the county boundary.

Down in the valleys are meadows of rich grass, up on the hills are fields of waving corn ; where the oak-forest once flourished there are now open “ broad-acres,” and the transforma-

* Miller and Skertchly, “The Fenland Past and Present,” p. 1.

tion from what it was in early times, is almost as complete as in the fens. But the work was easier. Man had not constantly to be on the watch lest his enemy, water, should in a few hours wrench from him his gain of years of toil; but here on the contrary, he was often in search of water and has had to dig deep down to find sufficient for his daily needs.

Thus here is a second difference between the two parts of our county. Here are two contiguous areas; in one there is a superabundance of water and in the other a scarcity; in one, man digs his drains and erects his windmills to get rid of water, while his neighbour digs his wells and erects his wind-pumps in order to bring up to the surface water for man and beast.

Climate.

The county is not large enough to produce sufficient differences in temperature or rainfall to make it divisible into different climatic provinces, neither is the relief so pronounced as to make any considerable change, as the following statistics show:—

	Temp. in F°.		Annual Rainfall. In inches.
	January.	July.	
Cambridge	37'6	61'5	.. 23'5
Wisbech..	37'9	62	.. 24'2

tributed throughout the year, but the summer and autumn have a slightly higher percentage than the winter and spring. There is a slight difference in the humidity of the atmosphere arising from the difference in drainage, but even this is generally equalised by the winds. When the wind is blowing out of a northern quarter, if mists are formed over the fens, they roll up on to the uplands, giving a dampness to the atmosphere that is foreign to chalk lands unless they are near to fen or sea.

Therefore the differences in relief and drainage are far more important than the slight differences in climate in their effect upon the human occupation of the county. The uplands in winter are somewhat colder and bleaker than the sheltered valleys between them, but the low-lying plain so open to the North Sea influence is as cold and bleak as the uplands to the south.

As we proceed it will be seen that the method of inquiry adopted in this study is essentially an analysis of the details given on the 1-in. ordnance survey maps of the district. Occasionally other maps are used in order to make clear certain points, and naturally some first-hand information is used, obtained by visiting

The rainfall is fairly evenly dis-

the actual localities. Statistics for various purposes are introduced when required.

The reasons for using this method are fairly obvious. The first is that good, accurate maps can easily be obtained, the only disadvantage being that generally so much is shown on the one map, that it is not easy merely by looking at the map to isolate the information required from among the different groups of symbolised knowledge it contains. Hence the process of dissection or analysis becomes necessary. Most of the maps reproduced here have been made, with the sanction of the Controller of H.M. Stationery Office, by tracing the particulars required from the ordnance survey maps, topographical or geological.

The second reason is, that many points that are quite obvious when obtained in this way are far from being

self-evident on the face of the ground. Particularly is this the case in the question of relative or actual heights of places above sea-level.

A third reason is that, in practice being so easy, it is a method that may be introduced into the geography classroom, and affords a training which will develop observation, analysis, reasoning and draughtsmanship. It is, however, a method which makes considerable demands upon the teacher's time, for unless sufficient material is provided, he will have to duplicate the required maps.

A fourth reason, which is all-important, is, that the student will be able to verify and substantiate geographical facts by actual observation in his own immediate neighbourhood, which he has discovered by map analysis. This gives reality to the subject and confidence in himself and his method.

CHAPTER II

THE FEN GATEWAYS—UPLANDS AND RIVERS IN SOUTHERN CAMBRIDGESHIRE

BEARING in mind the short description of the physical characteristics of Cambridgeshire, given in the preceding chapter, let us turn to the examination of maps upon which some of these features are shown.

Fig. 1 is a map showing the fens and their boundary wall of uplands. The first thing we notice is the regular shape of the fenland area. The boundary is almost elliptical in shape, with the major axis twice as long as the minor, and we note how in the north-east quadrant, it is broken and open to the North Sea through the bay called the Wash. This is the "sea gateway."

Then notice the rivers entering the fens through the boundary wall: the Witham, Welland, Nene and Great Ouse with its tributaries Cam, Lark and Little Ouse, have all cut their way through the wall, and at the points where they leave the uplands and enter

the plain, we have the seven important "land gateways" leading into and out of the fens.

Both sea and land gateways have admitted into the fenland streams of geographical factors, physical and human. It is through the Wash that the tidal currents of the North Sea still carry the debris by which the land of the fens has been and is being built, for geologists tell us that the sediments of which the fenland is composed are not deltaic, carried by the rivers from the adjoining uplands, but that they are sea-borne silt, brought in by the tides. It was through this same gateway that Saxons and Danes found one way into Britain, and later, that the small merchant craft of mediæval times brought produce from the continent and ascended the slow-flowing rivers as far as Cambridge, Huntingdon, Peterborough and Lincoln.

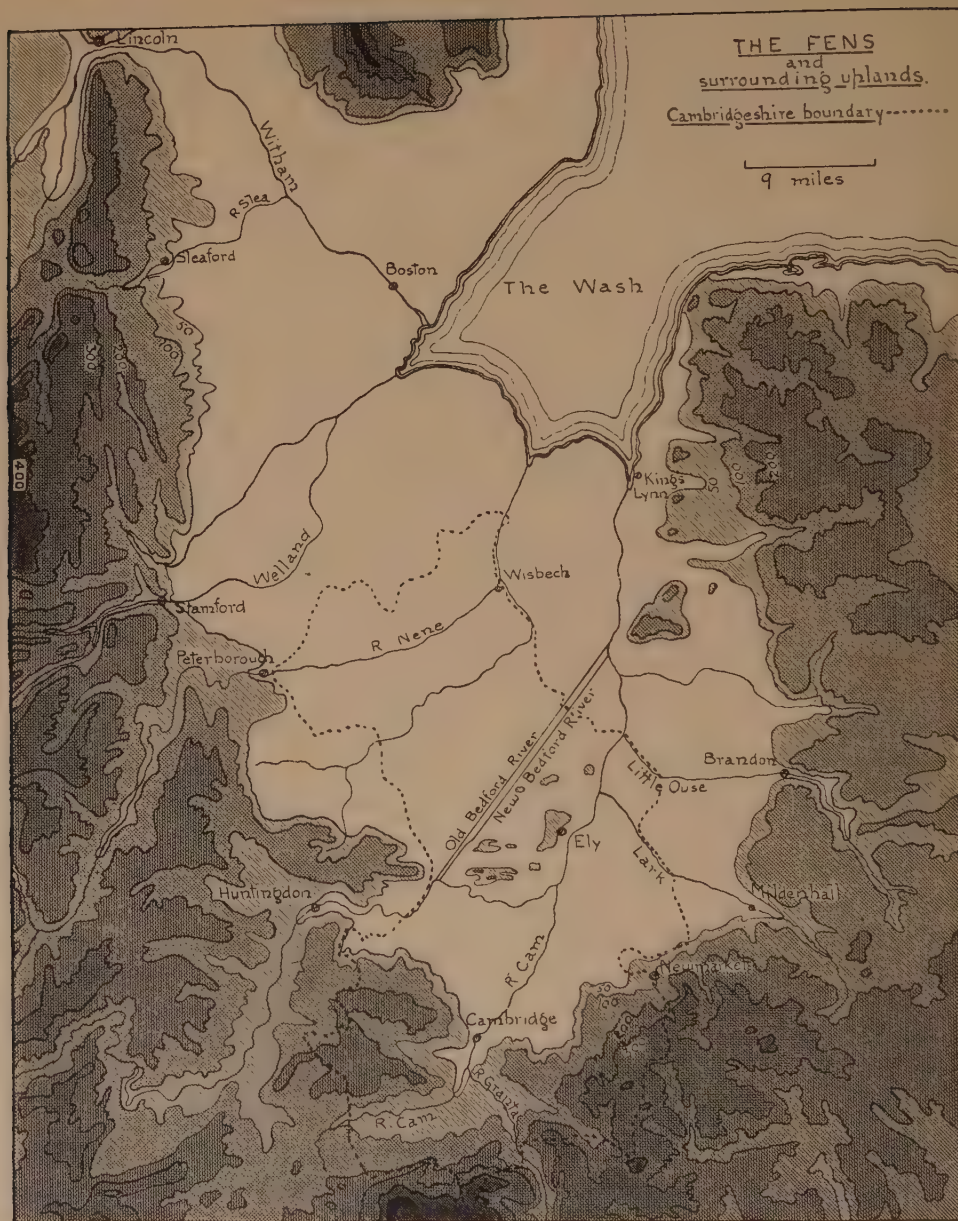


FIG. 1.—THE FENS AND SURROUNDING UPLANDS.

Based upon the Ordnance Survey Map with the sanction of the Controller of H.M. Stationery Office.

Through the land gateways the rivers come with their flood-waters, but also carrying a burden of mud. This they deposit on their beds when they enter the plain, which causes, in time, the bed of the river to be built up higher than the surrounding land. Through the same entrances men have come, for different reasons, on different errands. To-day through these same gateways the roads and the railways come, carrying into the fenland what is wanted from outside, and taking out the produce of its fertile farms.

It should be observed that the rivers flowing into and across the fens converge towards a common centre, namely the Wash. The Witham from the north-west, the Welland and Nene from the west, the Great Ouse from the south-west, the Cam from the south, the Lark from the south-east and the Little Ouse from the east, all flow towards this one point. Thus these rivers as they get nearer to the sea, also get nearer to one another. Some join before reaching the sea, and others have been joined by artificial cuts made by man in his endeavours to drain the land.

It must not escape our notice that there is marked on the map a group of low hills near to Ely. These are some

of the islands in the fens, and although generally only just over 50 ft. above sea-level, they are conspicuous objects on the great flat plain. Any one who has cycled into Ely from whichever direction, is conscious of the rise in the ground as its famous cathedral is approached. Later we shall find other patches of rising ground, but because they do not reach the 50-ft. contour they are not shown on this map. This group, however, is important, and its position in the southern fens between the Bedford canals to the west and the Great Ouse to the east should be remembered.

There is one other group of objects that, although not shown here (they will be found on a later map drawn to a larger scale), strikes the eye even of the most unobservant when crossing the fens. We have already said that the rivers tend to build up their beds above the surrounding land, with the mud they carry down from the neighbouring uplands. Add to this the fact that the draining of the fens by ditch, drain and canal has caused the land to sink, and we then understand how necessary it is to embank the rivers and canals.

So the sight, common in this area, of great banks of earth rising from 10 to 20 ft. in height and stretching

for miles across the country, will at once attract the notice of the traveller who is a stranger to the district. These are the embankments built along the sides of the main watercourses, sometimes doubled and then called the inner and outer banks, and sometimes standing with no water between them now, for the stream, along whose banks they were built to confine in its channel, may have been diverted into some other course at a later date.

The map also shows the boundary of Cambridgeshire and the relation of the county to the fens and uplands. The boundary is characterised by its irregularity like other English county boundaries. It has often been pointed out that its shape is not unlike that of the coast-line of England and Wales. This can be seen more easily by an examination of it as shown with greater exactness in Fig. 16, p. 73. The present map, however, shows that the relation in area between fenland and upland is approximately what has already been mentioned, one-third upland, two-thirds fenland.

If we have not only looked at the map, but have looked beyond it, and mentally seen the real things that it symbolises, if we have used our imagination and filled in the gaps left in the descriptions, we can now turn

our thoughts to other areas, either in our own country or in lands across the sea, which have something in common with our fenland.

Sedgemoor in Somersetshire, and Holland on the mainland come at once to our minds, and on a journey across either of these two areas we are reminded of our fenland. There are, however, points of contrast as well as points of similarity, but into these it is not our purpose to enter here. It is well, however, to remember that much of Holland is actually below sea-level, while the English fenland is not generally below, even if only a few feet above, the level of the sea. Or, to take another example, further afield and with more contrasts, we should find much in common between our fens and the great plain of Northern Italy. Innumerable embanked watercourses with flat lands between, a sense of wide openness and flatness gained from any point of vantage we may reach, and a rich fertility of the soil, would remind us of our fens.

The frontispiece is a reproduction of a relief model of the southern part of Cambridgeshire. It was constructed by smoothing with plasticine the abrupt edges of a cardboard step-model. It does not give a true representation of the district, for the relief is

far too pronounced ; the vertical exaggeration is approximately five, but this enables us to pick out the hills and valleys more easily. A curious optical phenomenon is often observed in photographs of such models : the hills sometimes appear to be hollows and the valleys raised ground. If this occurs it is well to look away for a moment or two and to concentrate on the fact that it is lighted from the left-hand side, when the model will right itself.

The position of the Cam and three of its tributaries is marked, and the location of Cambridge, Newmarket, Saffron Walden, Great Chesterford and Royston should be noted. The southernmost part of the fens is shown in the northern part of the model, and the hills in the south rise to just over 450 ft.

It will be seen that a belt of high land extends from the north-east corner of the model down to the south-west. This is part of the long ridge of high land that runs across England from Norfolk in the east to Wiltshire in the south-west, and called in this district the East Anglian Heights. The ridge becomes higher to the south-west of Cambridgeshire, but it retains other characters throughout its entire length. The crest of the

ridge consists of rounded hills, whose convex curves, nowhere very steep, are graceful in outline. The side of the ridge facing the north-west is steeper than the opposite one, which slopes gently down towards the east and south-east.

It will be noticed that a spur of high ground juts out from the main ridge towards the north-west in the direction of Cambridge town, which it approaches to within about three miles. The end of the spur overlooking Cambridge is called the Gog-Magog Hills, and no one knowing Cambridge can possibly be unfamiliar with " The Gogs."

It will be seen from the model that the ridge which occupies the east and south of the area is separated from more high land, but not so high, in the west of the map by a broad river valley—the valley of the Cam. The Cam flows in a north-east direction generally parallel to the ridge of the East Anglian Heights. The slope of this ridge facing the Cam valley is called an escarpment, and such a valley parallel to the escarpment is termed longitudinal.

The ridge of hills is composed of chalk rocks, which on the crests is covered with a glacial deposit of boulder clay, as likewise the high

ground to the west of the Cam valley. These chalk rocks dip, that is, slope, gently towards the south-east, and the geologist looks back to a time when the Cam valley did not exist, but the high land to the west was a continuation of that to the east. This enlarged upland area in those far-off times was probably highest to the west and formed a continuous surface gently sloping to the south-east. If this was the case then the earliest drainage of the district would be by rivers flowing down this inclined surface. Such streams have their direction determined by the original slope of the land—in fact, it would be directly in consequence of that slope—and such rivers are therefore termed *consequent* streams; but the valley of the Cam cut into this highland by erosion, only appeared at a later date, that is subsequently to the earliest river valleys that were formed by the original drainage, and such a valley is termed *subsequent*.

The Cam rises just beyond the Cambridgeshire border in the south-west corner of the map at Ashwell, but the low land of the Cam valley is continued still further to the south-west, a low watershed dividing it from other tributaries of the Great Ouse. Its actual source is well worth a visit,

for at the base of the chalk escarpment to the south-east of the little country town, the cool and sparkling water can be seen issuing from scores of tiny places in the ground.

Next turn to the tributary on the left bank of the Cam, called the Bourn brook, coming from the high land to the west. Its valley is easily distinguishable on the model, and we notice that it is practically at right angles to the main valley. The stream is but small, a mere brook, but its direction is clearly down the dip of the strata, that is to the south-east, and it may be that it is the present-day representative of one of those early rivers which flowed right across the original upland, where the Cam valley now is. At any rate, it is interesting to note that if we produce the line of the present valley further to the south-east across the East Anglian ridge, we shall find that it leads directly into the valley of the Stour, seen on the map just beyond the watershed in the south-east corner, a river which reaches the North Sea at Harwich.

The two tributaries and their valleys on the right bank of the Cam now call for attention. Alternative names are given on the ordnance survey map to the Cam and its tributaries. For example, the Cam is called Cam or

Rhee, and the tributary which issues from the uplands at Chesterford, Cam or Granta. Throughout our study in this book, the stream in the broad valley rising at Ashwell is called the Cam, the tributary flowing past Chesterford, the Granta, the one in the adjoining valley, the Lin, reserving the name Bourn for the left-bank tributary flowing past the village of the same name.

Following the two right-bank tributaries into the uplands we notice that their valleys are similar, that they are narrow and have relatively steep sides compared with those previously examined. We must remember that the escarpment face of the eastern ridge through which they flow had its origin when the Cam valley was being formed; hence these two valleys, cut through the escarpment face into the uplands, must have been eroded even later than the Cam valley. The streams occupying these valleys, the Granta and the Lin, have cut their valleys some distance back into the ridge, and thus are flowing in the direction opposite to the dip of the strata and of the streams that drain the uplands to the south-east. Such streams and valleys are called *obsequent*.

Thus it happens that the streams in

this part of Cambridgeshire, although not large, are interesting in their physical history, as they provide an illustration of the three types of rivers, consequent, subsequent, and obsequent.

If we have grasped, by this short description, the idea, discussed at much greater length in text-books on physical geography to which the reader is referred, that the drainage of an area is a thing that changes with the lapse of time and that the present system is the outcome of all that has preceded it, the streams in our neighbourhood will have an additional interest for us when we recognise that each has a physical history of its own different, it may be, from that of its neighbour.

Now turn to Fig. 2. Here we have three sections drawn across the valleys of three of the streams, the Cam, the Bourn and the Granta, at the points where these cross the 50-, 100- and 150-foot contours. The sections are taken at right angles to the rivers and are arranged at their proper heights above one another, so that they give us an idea of the shapes of the valleys when looking upstream. By comparing the three diagrams it is readily seen that they are of different types, corroborating what we have already

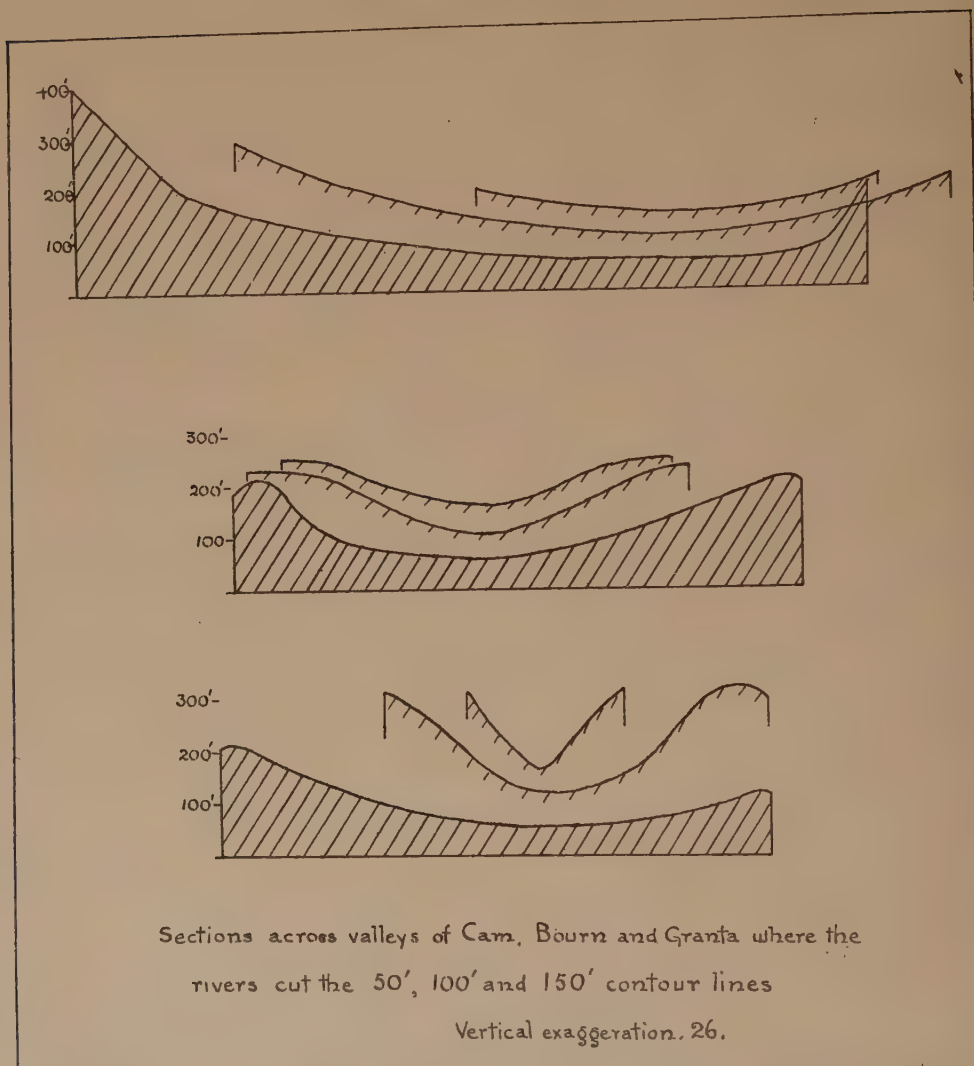


FIG. 2.—SECTIONS ACROSS THE VALLEYS OF THE CAM, BOURN AND GRANTA. *

described. The valley of the Cam is broad, shallow, flatfloored, and we notice that the left-hand side looking upstream, that is technically the right-hand side, is much higher than the opposite one. This is a characteristic of valleys eroded along the strike of the rocks, in the way in which the Cam valley was cut, producing a ridge of hills with an escarpment face bounding it on one side, and generally a gentler slope on the opposite. Thus the valley in section may be described as asymmetrical.

That of the Bourn is narrower and the two sides have similar slopes giving a symmetrical section ; this is a characteristic feature of valleys eroded on the dip slope, that is of consequent valleys.

The valley of the Granta, and that of the Lin is similar, is much narrower with steeper but still similar sides, facts which appear quite reasonable in the light of the drainage history of the district. The valleys should be symmetrical, as they have the same relation to the strata on both sides, and being younger than the consequent valleys, such as the Bourn, sufficient time has not yet elapsed for the sides to become as gentle in gradient as those of the latter stream.

It must be remembered that the

slope of the valley sides as shown in section is much exaggerated beyond what it is in reality, but as the scale is the same in each case, the sections are comparable.

Having thus learnt the geography of the streams and valleys in our county, with their characteristic shapes, we are in the position to understand those in other parts of the world. The Cam will help us to understand the Warwick Avon, for example, which flows parallel to the oolitic escarpment in a subsequent, asymmetrical valley with a broad floor. Or to take an example from France : the upper valleys of Meuse and Moselle, with their famous côtes, are of the same type, only on a larger scale.

The Bourn with its consequent valley will teach us to understand the upper courses of the streams which flow down the dip slope of the Cotswolds to form the Thames, while the obsequent Granta is of the same type as the lower Bristol Avon, where it escapes through the escarpment of the Cotswolds to reach the lower Severn.

Other rivers still more complicated in character, such as the Seine, might be referred to these simple Cambridge-shire streams, but sufficient has been said to indicate the method of using

local geography as the basis for the interpretation of geographical facts beyond our county boundary.

Before concluding this chapter reference should be made to the high land to the west of the Cam valley. It can be shortly described as a low plateau, between 200 and 300 ft. high, with two ridges of about the same height extending eastwards from it. The

more southerly of these ridges gives us, on a small scale, the best example we have in Cambridgeshire of a symmetrical line of hills, forming a watershed between the drainage to north and south; and the broader plateau surface, covered with clay, is a gathering ground from which small streams flow north, south, east and west.

CHAPTER III

TOWNS IN THE GATEWAYS—POSITION OF CAMBRIDGE—GROWTH OF THE TOWN—THE ROUTE TO LONDON

It is significant that Cambridge is the only town of any size in the county, and in this chapter we shall examine the factors with respect to position and relief which will account for its growth and development.

Its population is about 59,000, while the next largest is Wisbech with 11,000 people, and then come March, Ely, Chatteris, Whittlesey, all of which, except Cambridge, are in the northern part of the county.

But we must look beyond the county boundary if we are to understand why a large town should grow on the site where Cambridge stands. Turn back to Fig. 1, p. 8, and we notice that a town is situated in each of the "land gates" into the fens, and therefore evidently such a position is favourable for the site of a town. Beginning in the north-west, the following is the list of these towns with their populations, which will show that some are

larger than others, as might be expected :—

Lincoln on the Witham	..	66,000
Sleaford on the Slea	..	6,400
Stamford on the Welland	..	9,600
Peterborough on the Nene	..	35,000
Huntingdon on the Great Ouse		4,000
Cambridge on the Cam	..	59,000
Mildenhall on the Lark	..	3,600
Brandon on the Little Ouse	..	2,400

This list shows us that Lincoln and Cambridge are the largest and are about equal in size; some of the towns in the gateways are still quite small, so that the mere fact of standing in a fen gateway is not sufficient to warrant growth and development. We notice that all of these towns are approximately on the 50-foot contour, the line which we have previously chosen to divide the fens from the uplands, a line which we shall call in the succeeding pages the "fen-line."

This term is used in the same sense as other well-known ones, such as

"snow-line," "tree-line," "timber-line," to indicate that some limit is reached. In this case it is an approximate physical boundary marking the limit of the fens at the foot of the slopes where the uplands reach the plain.

Later it will be shown that it is not only a physical boundary, but also a line of economic interest and importance, separating two areas which differ in some of their occupations, products and interests, in addition to being a favourite and suitable site for villages.

If large-scale maps are examined it will be seen that almost all round the fens village after village is situated on this "fen-line." We shall demonstrate this point for Cambridgeshire villages in a later chapter, but to appreciate the site of Cambridge town, which concerns us at present, we must imagine this fen-line to be, what it is in reality, not only a line where the fens end and the uplands begin, but also a line upon which many towns and villages are situated. As a matter of fact, there are over a hundred of them marked on Bartholomew's half-inch map, between Lincoln and King's Lynn.

The question then naturally arises, "Why have some of these developed into large towns, while others still

remain small villages?" and quite as naturally the answer comes that evidently one reason for the growth of some is that their situation in a gateway in the boundary wall between fen and upland has favoured them beyond their neighbours, for the list already given contains the largest of the towns and each of these is situated in one of the gateways.

In order to appreciate the significance of these gateways it will be necessary to look at a map of England to see whither they lead. Commencing in the north-west, it will be seen that the Witham gap leads directly without any obstacle into the large and important valley of the Trent. It is the easiest gateway of all, the lowest and the shortest, and the valley of the Trent has large industrial centres in it, containing many people. Thus through this gap much produce and many people pass, backwards and forwards, and this is one reason why Lincoln has grown to be a large town. There are other reasons why Lincoln is so large, but they do not concern us at present.

The next two towns, Sleaford and Stamford, are much smaller, and an examination of the map shows us that their gateways are neither so

easy nor so short as the Lincoln gap. When we trace on the map of England the valley of the river Nene, and Peterborough the third largest town on the fen-line stands in its gateway, we shall find that it is an easy route, but a long one, into the Midlands. Partly on this account, Peterborough has grown to be a town of considerable importance among the fen-line towns, but it has not the advantages that Lincoln possesses, and so is not much more than half the size.

Next comes Huntingdon with only 4000 inhabitants, disappointing in one way, because it is on the Great Ouse, which is the longest river flowing into the fens, and we might have expected a much larger town. But the route along its valley is long, and as the map shows it does not lead into any busy industrial region, as the Witham does, and so Huntingdon remains a small town.

The next gateway is the one in which Cambridge stands, and is the entrance through which the Cam reaches the fens. If we examine the map we shall see that the Cam is only a short river, and like the Great Ouse, its valley does not lead into any important area. But we must follow one of its tributaries, whose valley we have already examined, namely,

the Granta, to understand one reason why Cambridge is almost as large as Lincoln. The map of England shows that the route of this valley after crossing a low watershed, enters the valley of the Stort, a tributary of the Lea, and it then conducts us without any difficulty down to London. This is shown in some detail in Fig. 4, p. 24. This is the importance of the Cam gateway; it provides the easiest and shortest route between the fens and London, and this gives us one of the reasons why Cambridge has grown into such a large town, in the group of towns under examination. It is significant, also, that Cambridge is at the southernmost extension of the fenland.

Still further to the east, where the Lark and the Little Ouse enter the fens, the towns of Mildenhall and Brandon are situated, but neither of these is large, in fact, they are the smallest of the group, for neither the Lark nor the Little Ouse leads to a region of industrial importance.

Other factors which no doubt have influenced these towns on the east are, first, that the land area between the fens and the coast is not extensive, and secondly, that much of the land bordering the fens between Mildenhall and Brandon is heath-land,

sparsely populated and noted for its infertility.

Thus it appears evident, from an examination of these gateways, that the size of the towns situated within them is at least partly controlled by the importance of the region to which the gateway leads, for we find that the largest towns are situated in those which lead towards the most important commercial and industrial areas.

In Fig. 3 we have the site of Cambridge drawn on a larger scale than in the previous map, and to this we will now turn.

It shows us that the town is situated in a bend of the river and that land more than 50 ft. above sea-level approaches the river on each side, both to east and west. This is the lowest place on the river, where both sides are composed of fairly firm ground, and here probably there was also a comparatively easy place to ford the river, in the days before it was spanned by a bridge. It is known that a road constructed by the Romans across country from Colchester to Leicester crossed the river at this point. We shall find it on a later map, but its position and direction are fairly well given by the one marked on this map as leading from Haverhill to Huntingdon. Historians tell us that the

Romans also made the one called Akeman Street, leading from Ermine Street (the old North Road, not shown on this map, but see Fig. 12, p. 52) through Cambridge to King's Lynn.

It has already been pointed out that the fens in their natural state were a barrier, and so any one who wished to pass from the middle of England into what is now Norfolk, or in the opposite direction, would go round the southern end of the fens and cross the Cam where Cambridge now stands. Thus the fens in early times played a part similar to that of Lake Michigan in North America, and the site of Cambridge corresponds to the site of Chicago.

William the Conqueror built a castle on the rising ground on the west side of the river, and gradually, owing to all these factors, the place became a market centre to which people brought their wares along the converging roads to exchange for other commodities they needed.

In the Middle Ages Cambridge became noted for its fair, known all over Western Europe, held annually on what is called Stourbridge Common, a large flat open space on the right bank of the river at the northern end of the town. Merchants from

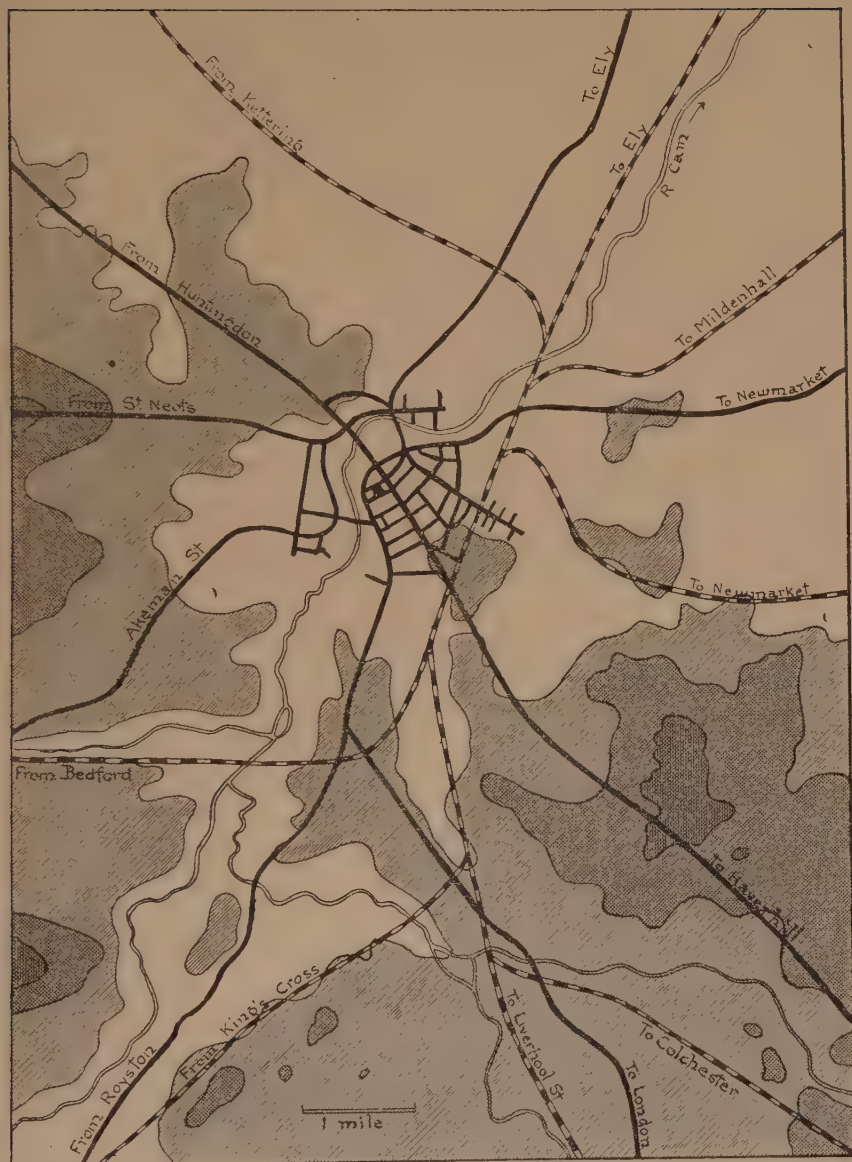


FIG. 3.—CAMBRIDGE AND DISTRICT.

Based upon the Ordnance Survey Map with the sanction of the Controller of H.M. Stationery Office.

all over England and also from Western Europe and Mediterranean countries came to this fair, at which a very large amount of business was transacted.

The map shows us that at the present time main roads converge upon the site from all points of the compass, some of them following the river valleys and some coming across the higher ground. Further, it will be seen that eight railway lines radiate from Cambridge as a centre, and it is possible to reach Cambridge by what were called until recently, the Great Eastern, the Great Northern, the Midland and the London and North Western railways. The roads and railways look something like the spokes of a wheel of which Cambridge is the hub, and sometimes such a town is described as "a road and railway star."

Although, like the mediæval fairs in other parts of the country, the Stourbridge Common fair is no longer held, Cambridge is still a market centre. Three markets are held weekly, the cattle market, the corn market and the general market in the old square in the middle of the town. In connection with the cattle market there is one point of special geographic interest. It will be shown later that

much of the land to the east and south-east and some to the west of the town is dry land and roadside ditches are seldom seen; but in the town the gutters between path and road are little paved channels full of running water—"the runs." These are artificially fed by water that comes from the "Nine Wells" at the foot of the chalk, 3 miles south of the town, and were made, it is said, by the generosity of an old Cambridge farmer and cattle dealer, Hobson by name, who had often noticed that the cattle coming into Cambridge market suffered from thirst. Few large towns have such waterways.

But Cambridge is far more than a centre to which people come to exchange produce in the markets. It is a university town to which students come from all quarters, north, south, east and west, and the map shows the routes by which they enter; and along these same routes they start their journey when "going down," carrying with them ideas and ideals to the ends of the earth. These are the "invisible exports" of Cambridge, education—learning in classics, mathematics, science, law, philosophy—and it is this which makes Cambridge one of the most important centres not only in England but in the world.

We are usually content to include among the important towns only the large ones, but if we estimate importance by influence and effect through long ages and over great spaces, then Cambridge easily comes into the class of important world-towns.

It is not intended to enter here into the history of the university, but if we went back to the beginning then we should find that Cambridge owes this importance to its position on the southern edge of the fens, the refuge to which in early time scholars retreated, where they built the old abbeys of Crowland, Thorney, Ramsey, Ely, and from which they came to Cambridge to meet their students.

A Cambridge lady describes the position of Cambridge in the following lines :—

“ Cambridge town is a beleaguered city,
For south and north like a sea,
There beat on its gates without haste or pity
The downs and the fen-countree,”

which is a poetic way of saying what we have explained.

In text-books dealing with the geography of the British Isles, and therefore where there is not sufficient room for going into details, Cambridge is usually described as a town on the edge of the fens and the seat of a

university. This chapter has shown in more detail what is really contained in such a brief description. On the other hand, Cambridge is sometimes classed with Bedford and towns in East Anglia and described simply as a market town.

From what we have shown it should be clear that Cambridge and Bedford are not in the same class as regards position, for while Bedford is purely a valley town, Cambridge is more, and should be classed with Peterborough and Lincoln, being not only in a river valley but also in a fen gateway.

Fig. 4 is a map showing some of the details of the Granta valley, the upper part of which might suitably be described as a corridor leading from London into the fens.

The Cambridgeshire boundary crosses the valley near Great Chesterford, but the valley offers so many points of interest that we are tempted to examine it.

First we notice that the stream has a road on each side from Shelford, 4 miles south of Cambridge, as far as Saffron Walden. Villages are found on each bank a short distance away from the river and joined by these roads : Trumpington, Grantchester, Great and Little Shelford, Stapleford, Sawston, Whittlesford, Duxford,

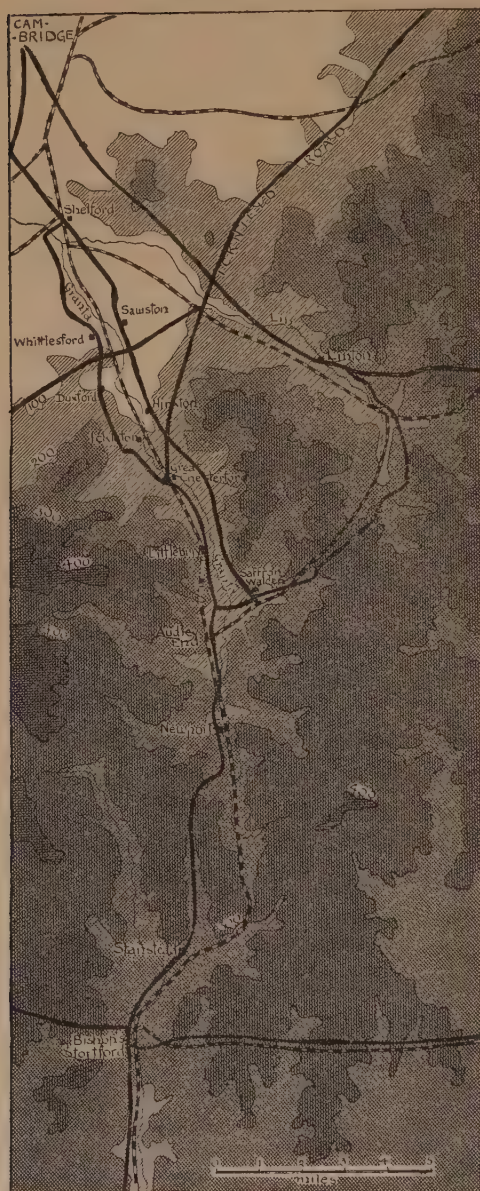


FIG. 4.—THE GRANTA VALLEY.

Hinxton, Ickleton, Great and Little Chesterford and Littlebury all occur in the 16 miles between Cambridge and Saffron Walden, and later we shall describe Grantchester as typical of this class of valley villages. The main railway from London (Liverpool Street) to Cambridge follows this same valley, and the contrast should be noticed that while the roads joining the villages in the lower part of the valley avoid the stream and are generally well above it, safe from flood water, the railway takes as straight a course as possible and crosses the stream at many points. There are five crossing places between Shelford and Chesterford. Beyond Great Chesterford the valley becomes narrower, and in the confined space between the high ground on each side which rises quickly to 300 or 400 ft., we have the river, two roads and the railway penetrating into the uplands. After passing Audley End station we note that there is only one road, but it and the railway keep with the stream in its valley. Further south it is seen that the road crosses into the valley of the Stort, a tributary of the Lea, before the railway crosses the watershed from the Cam valley into the Lea valley, and then both road and railway con-

Based upon the Ordnance Survey Map with the sanction of the Controller of H.M. Stationery Office.

verge on Bishop's Stortford. This valley route through the chalk ridge affords us a small but suggestive example of a transverse route. Such valleys are usually narrow in comparison with longitudinal ones, such as that of the Cam, and we note that the line of water-parting does not coincide with the position of the highest ground, for most of the land rising above the 400-foot contour is to the north of the source of the Granta.

This is explained by the fact already mentioned, that the Granta valley was not in existence until after the Cam had cut its valley and thus produced the escarpment face of the ridge, but since then the Granta has cut its valley further and further back from Chesterford past Audley End to its present position on the southern side of the hills, that is, it has "invaded" the valley of the Thames.

By following carefully the railway line through the valley we see that near Littlebury the track is about 100 ft. above the stream, and at this point there are two tunnels as the map shows, but we are still 6 miles from the stream's source, at which point, however, the watershed is crossed without tunnelling.

The Lin valley, a little further to the north-east, also contains a stream,

road and railway. The stream is not so large, and the railway is only a single track, a cross-country line to Colchester. The valley is of the same type, that is, transverse to the line of hills, but the Lin has not cut its valley so far back through them. Now notice that both to the north and south of the hills, roads run parallel to them, and join the transverse routes by a kind of gridiron pattern.

As is well known, this is the route plan that is found in many mountainous areas; the narrow transverse routes across the mountains are linked up at their exits by the roads parallel to the mountain range. Reference might be made to the Apennines and the Alps, and thus we see the same factors controlling routes through the low East Anglian Heights that control movement across the high mountain ranges in other lands.

Returning to the more open part of the Granta valley, between Chesterford and Cambridge a few measurements will provide some interesting results. When we measure the distance between Chesterford and Shelford by different routes we obtain the following distances. (Measurements should be made on the 1-in. ordnance map.)

Chesterford to Shelford—

as the crow flies	=6·6 miles.
by railway	=6·8 miles.
by road	=6·9 miles.
by river	=9·4 miles.

If we note that the first of the above is the modern aeroplane route, we see that, beginning with the last as being the first used, the construction of routes has shortened the distance between these two villages by about one-fourth. Further, if we give the following rates to the modes of transport employed, 3 miles per hour by canoe on the river, 4 miles per hour by the farm waggon on the road, 30 miles per hour by the train on the railway and 60 miles per hour by the

aeroplane, the distance as expressed by time between the two villages is as follows :—

Chesterford to Shelford—by water	=188 min.
by road	=103 min.
by rail	=14 min.
by air	=7 min.

Geography teaches that the world is getting smaller by the construction of shorter routes and increased efficiency of machines, and our county affords us this example, of course among others we might examine, of how man is overcoming distance by his improvements in means of communication.

CHAPTER IV

VILLAGES AND PARISHES TO THE EAST OF CAMBRIDGE—POSITIONS IN RELATION TO (a) RELIEF, (b) ROCK STRUCTURE—NOTES ON METHOD —PARISH BOUNDARIES IN RELATION TO (a) NATURAL, (b) ARTI- FICIAL FEATURES

It is usually considered sufficient, when studying the geography of a country, for the student to explain the growth of the largest towns and cities, as a result of their location and general physical environment; but when we are concerned with the study of only a small area such as an English county, it is well to examine the sites, not only of the towns but also of the villages. It is sometimes forgotten that even large cities were, once upon a time, only villages, and if we can conjure up in our minds the conditions when in the county of Cambridgeshire there were no towns at all, but only hamlets, then the reasons why some still remain small, while others have grown beyond all recognition of what they were in their early days, will appeal to us far more forcibly. The men who chose the site for the first settlement

which formed the nucleus of a village had no idea of what that site might become in the future. They were not concerned with the future, they only considered their own immediate needs, but as we shall see, in addition to their self-interest, there was reason in all their selection.

Occasionally, to-day, a site is specially chosen and a city on a large scale is planned from the beginning, as Washington in the United States or Canberra in Australia, with some special purpose in view, but old cities have developed from very humble origins and their founders had no idea of their future greatness.

It has already been said that generally our maps are so full of information that it is only with great difficulty that we can isolate particular points we wish to study, and it often

becomes necessary to analyse and separate the whole into its component parts before we recognise relationships

This method of map analysis in relation to village sites is illustrated in the following chapters. Fig. 5 has

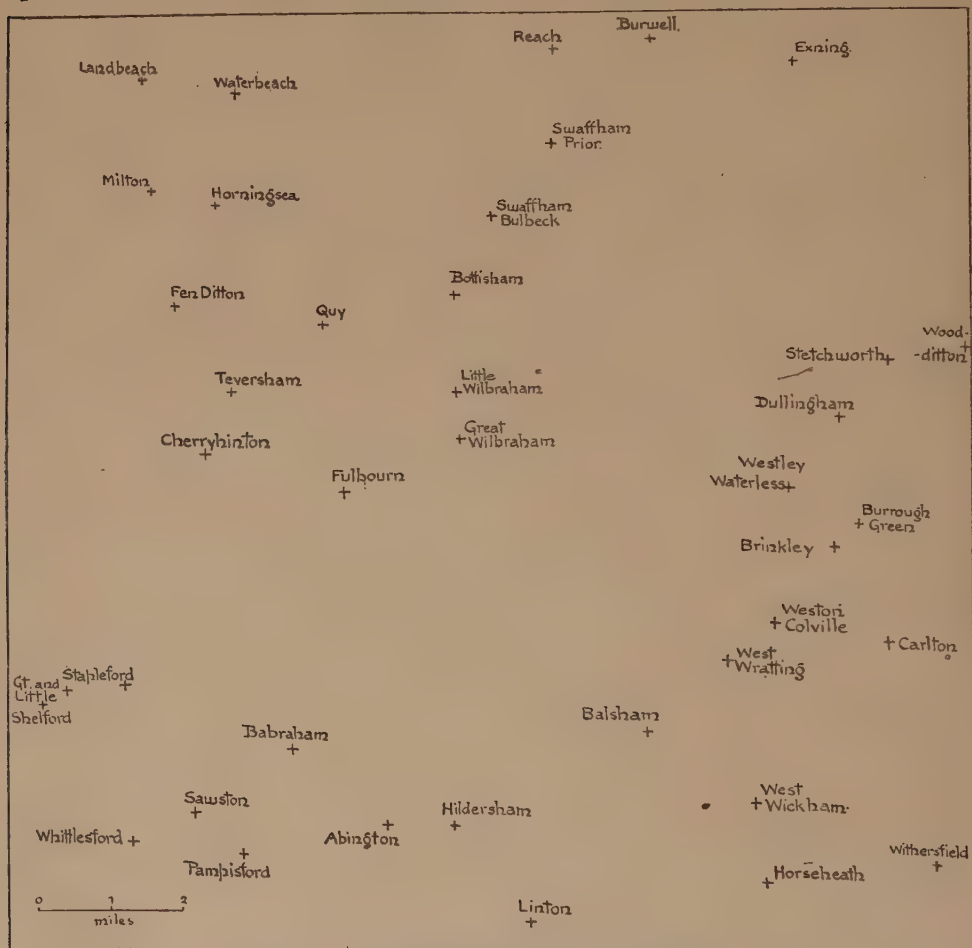


FIG. 5.—VILLAGES TO THE EAST OF CAMBRIDGE.

Based upon the Ordnance Survey Map with the sanction of the Controller of H.M. Stationery Office.

that become apparent as soon as they are isolated from the whole.

been prepared simply by marking off from the 1-in. ordnance survey map

the positions of all the villages in an area to the east of Cambridge, measuring approximately 13 miles square, that is, an area of about 170 sq. miles. The location of the village in each case is marked by the position of the church. Cambridge and Newmarket (just outside the county), the only towns that come within this area, are omitted; the former, if marked, would be halfway up the western boundary and the latter near the north-east corner of the map. Each of the villages, with the exception of Reach, gives its name to a civil parish and contains the parish church.

There are forty villages marked, and it is interesting to note that their names include eleven "hams," nine "tons," four "fords," one "heath," one "field," one "well."

These terminations help at once to some classification. For instance, in the north-west Waterbeach, Horningsea, Fen Ditton, Quy suggest a relationship with the fens, while in the south-west the "fords" suggest the presence of a river valley.

The distribution is by no means uniform, for one cannot fail to observe a large curve-shaped area extending from the north-east to the south of the centre of the map and then towards the north-west, which is most

conspicuous, for it does not contain a single village. It is a villageless area with Cambridge and Newmarket situated at its extremities. The average breadth of this area is over 4 miles and its length about 12, so we have here a continuous area of about 50 sq. miles in which there is not a village.

Farms are dotted about on its surface, as we shall see later, so we must not imagine it as an area in which there are no houses, but as one in which there are no villages.

We will now examine these village sites in relation to two important physical features: (1) watercourses, (2) height above sea-level, and so we turn to Fig. 6, on which the watercourses, the 50-foot contour and all the villages that occur in the area are marked. The area included here is rather smaller than in the previous map so as to exclude some villages which will be examined later.

This map shows an area of 90 sq. miles, and a cursory glance at once reveals certain relationships between village sites, contour lines and watercourses.

We might notice them in the following order. The 50-foot contour approximately divides the area into two equal portions as it runs generally

in a south-west to north-east direction. This contour is intimately associated

Cam. To the south-east of this contour, that is, in the part of the map

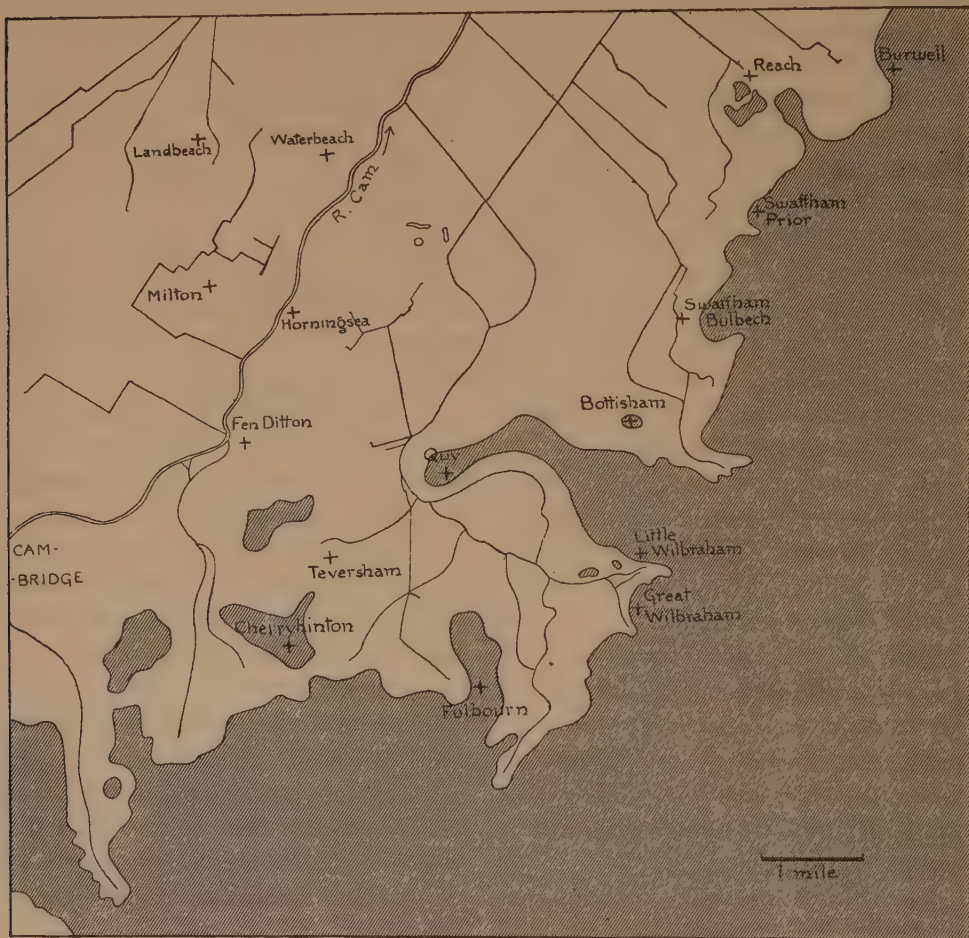


FIG. 6.—FEN AND FEN-LINE VILLAGES.

Based upon the Ordnance Survey Map with the sanction of the Controller of H.M. Stationery Office.

with the sources of streams which flow in a north-westerly direction to the

above 50 ft. high, we have a streamless area, which, by making a comparison

between this and the preceding map, will be seen to coincide with the villageless area, while the land to the north-west, that is, below 50 ft., is covered with watercourses. But the rectilinear appearance of many of these at once discloses the fact that they are the work of man, rather than the work of nature, or, in other words, this low-lying land belongs to the fens.

Previously we have described the 50-foot contour as the fen-line between uplands and fens, and here we see it drawn to a larger scale than in the earlier map, and at least fulfilling the physical qualities ascribed to it as a line of separation between two distinct regions.

Now consider the connection between this contour and the village sites. It is almost ridiculously clear how close that relationship is, between some of these villages and the fen-line. From Cherryhinton in the west to Burwell in the north-east they are all almost absolutely on this line, while the group to the north-west, whose names betrayed their location, is a group of fen villages as indicated by the relief and drainage of the area they occupy.

At this stage nothing more will be said about this group of fen villages, as they will form the direct object of

study in a later chapter, except to state that the particular spots upon which they stand are slightly higher than the surrounding land, although not reaching the 50-foot contour.

The chain of villages along the contour, however, claims our attention at present. It has already been said in Chapter II that all round the fens the place where fen and upland meet is a favourite location for settlements. If large-scale maps are examined it will be found that there are over a hundred of them between Lincoln in the north-west and King's Lynn in the north-east, but perhaps nowhere can the relationship be better seen than in this string of villages to the north-east of Cambridge. Following the name already adopted, these villages will be called the fen-line villages in order to distinguish them from other groups in the district.

It is well to remember that there is nothing in the villages when actually visited to indicate this coincidence in height above the sea. It is true that if cycling from village to village along this route one is conscious, owing to the fact that there are no steep hills to be overcome, that they are more or less at about the same altitude, but it is only when their positions are examined on the map that the strict relationship

is observed. Bench marks, of course, if they existed on the ground, would teach us the same truth.

Now it is evident that the founders of the villages were quite ignorant of the existence of the 50-foot contour, so we can at once dismiss from our minds that the sites were chosen on this account. There must have been much more obvious reasons which led the settlers to choose so unanimously this fen-line for the location of their settlements. Some reasons are quite clear when we remember the nature of the land on the two sides of this line.

In front, that is, towards the fens, the land is marshy, full of streams and meres, covered with long reeds, the home of abundant food in the form of fish and wildfowl. Behind the line, that is, towards the uplands, the land is dry, well drained, covered with grass, while near it, on the fen edge, good spring water is abundant. So man from primitive times has found here a suitable place for his habitation, although the factors determining his choice may have changed with his needs. A dry site for his reed hut, with fish and fowl within easy distance and plenty of drinking-water, no doubt appealed to him in early days. In later times marshy meadows for his

cattle, drier lands for his grain, with a dwelling away from the "rheumatic" fens, determined his choice.

Fig. 7 shows us the remaining villages in the area under discussion and their relationship to the river Lin and the 300-foot contour. The sites of the other villages already discussed are also shown in order that we may make our comparisons.

Those in the south-west corner, where we noticed the termination "ford" frequently occurring, are clearly related to the river and its valley. The actual sites, as in the fen villages, are generally determined by some rising ground which would be safe from floods and also by a place in the river where its bed consisted of gravel giving a suitable ford.

The proximity of the other villages to the 300-foot contour cannot fail to attract our attention, for it is almost as regular as that of the fen-line villages to the 50-foot contour. We shall call this group the "upland villages," and while doubtless the founders of these villages were conscious that they were selecting hill sites, no reason is apparent why all should be situated so nearly at the same height above the sea, and the contour map alone does not indicate why these particular sites were chosen. It will be clear to all that the

villageless, streamless area noted in Fig. 5, at the commencement of this

stand out so conspicuously in their relation to the village sites. In order



FIG. 7.—UPLAND AND VALLEY VILLAGES.

Based upon the Ordnance Survey Map with the sanction of the Controller of H.M. Stationery Office.

chapter, is the land between the two contours, 50 ft. and 300 ft., which

to see some probable reasons for the choice of this higher contour, it will be

necessary to consult the geological map of the district.

explanations, and others which we shall consider later. The villages are

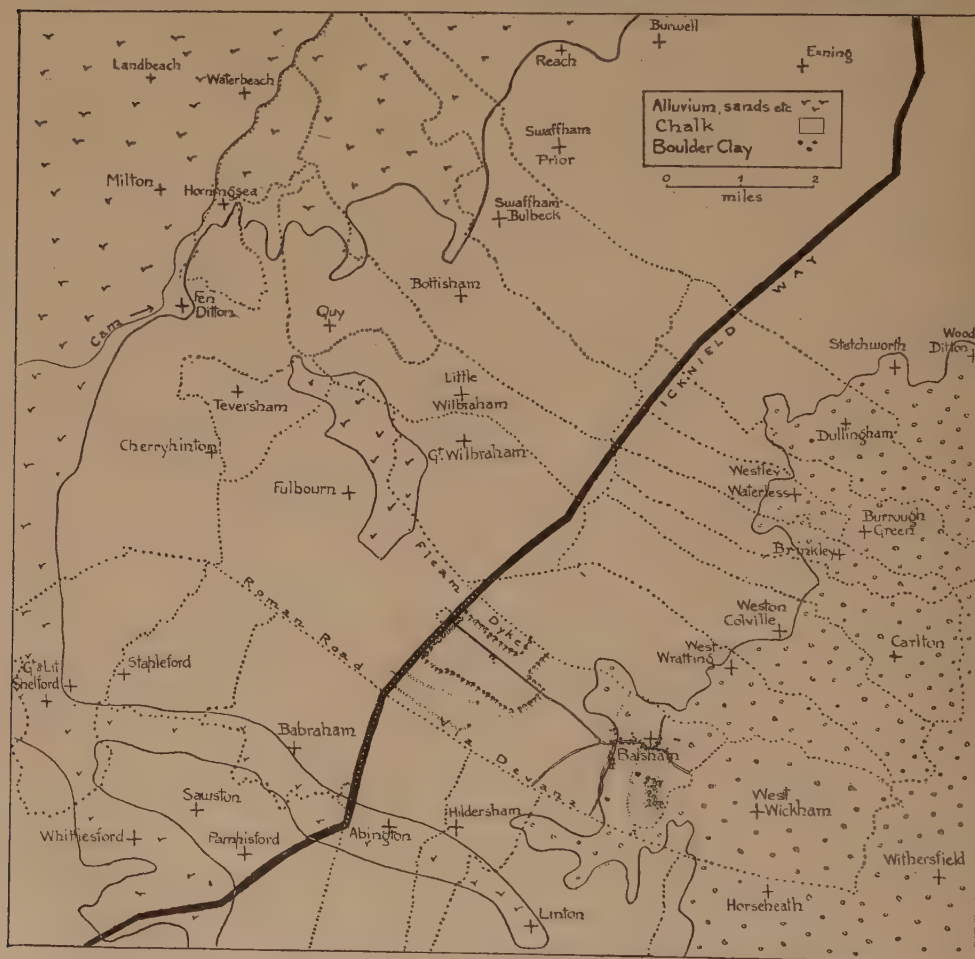


FIG. 8.—PARISHES TO THE EAST OF CAMBRIDGE. (With details for one parish.)

Based upon the Ordnance Survey Map with the sanction of the Controller of H.M. Stationery Office.

On Fig. 8 some facts are traced which will help in the necessary

marked as before by the position of the church, and also some parish

boundaries are inserted marked by dotted lines. The continuous lines mark approximately geological boundaries, and the prominent line across the map from north-east to south-west is the historically famous Icknield Way, which historians date as pre-Roman. In addition, the details for one parish, Balsham, are inserted, traced from the 1-in. ordnance survey map, and reference will be made to all these facts in later pages.

The surface is divided geologically into three parts. The north-west is occupied by alluvium, with patches of gravel, sand and clay, and the south-east is covered with boulder clay, while chalk occupies the whole of the central part of the map.

The boundary between the alluvium and the chalk will be found to agree fairly closely with the 50-foot contour (compare with Fig. 6), while the boundary between the chalk and the boulder clay almost coincides with the 300-foot contour.

The chalk area which extends between the 50- and 300-foot contours is the escarpment of the ridge, which we have already noticed in our description of the physical features of southern Cambridgeshire. Two other important features of the escarpment in this area are therefore now to be added,

namely, that it is practically streamless and villageless.

Chalk absorbs rain-water very easily, and there is no area sufficiently large on this side of the watershed covered with boulder clay to act as a gathering ground to form a stream down the escarpment face. Some of the rain which sinks through the chalk forms the sources of the streams to the north-west of the fen-line, but the surface of the chalk lands themselves is left dry and dusty. The contrast between the lands on the two sides of the fen-line is here most marked and deserves attention.

French geographers divide the district of Champagne, to the east of Paris, into two parts, which they call dry Champagne and wet Champagne. Dry Champagne consists of chalk slopes, wet Champagne of clay lands. Might we not, using similar names with equally good reasons, speak of these lands bordering the fen-line as dry Cambridgeshire and wet Cambridgeshire?

To return to the map. In the south-west corner the alluvium areas are the valleys of the Lin and Granta. It will be noticed that while the alluvium is characteristic of the lowlands, the boulder clay occurs on the crest of the uplands, and chalk occu-

pies the slopes leading from the former to the latter.

Associated with these three geological formations are three classes of natural vegetation. Broadly the alluvium corresponds to the fenland with its rushes, sedges and other water-loving plants. The natural covering of the chalk is grass with scattered groves of beech and coniferous trees, while the boulder clay of the crests under natural conditions and before man interfered with it, would carry deciduous forest consisting of such trees as the oak, elm and ash. No doubt there were many such forested areas in England in pre-historic and early historic times, and they have only disappeared before the axe of man in his endeavour to obtain more arable land. To understand the situation of the upland villages we must go back in thought to the time when these crests were covered with the boulder-clay forests, and it was just along the edge of this forest that the settlements were formed which gave birth to these villages.

Certain advantages evidently were present here that could not be found lower down the slope. These would include wood for building and fuel, the open chalk country would provide pasture and cultivable land, swine

could be kept in the forest, and water in the clay would be much nearer the surface than in the chalk. Until recently some of these villages have used for domestic purposes the surface water which naturally drains into the hollows and forms ponds, because wells have to be sunk so deep before reaching the bottom of the chalk that it becomes a difficult and very expensive business.

Thus we see that these villages were located, not without reason, but as a result of various factors operating so as to make these positions better than others in the neighbourhood, either further down on the chalk lands or deeper into the forests.

This was the western edge of the forest land, which, however, extended no doubt some distance to the east, and in the absence of historical evidence it would appear that the forest was occupied, and the villages formed by people moving westwards from the North Sea coasts. This inference is made from the fact that in the names of these upland villages the word "west" occurs so frequently, as in West Wickham, West Wratting, Weston Colville, Westley Waterless, and as further to the east, but beyond the boundary of the map, we find such villages as Wickhambrook and Great

and Little Wratting, it would appear that West Wickham was founded later than Wickhambrook, and West Wratting than Great and Little Wratting.

For a short time we will consider the results we have obtained and the method employed, for, as already stated, the object of this study is twofold. Reminding ourselves of what was shown in Fig. 5, we can regard this as a collection of unrelated facts obtained from a map.

We then proceeded by the observation of the village names to try to find any relationships that these might suggest. It gave us a partial classification in so far that the probability arose that some were fen villages and others river-valley villages. This was confirmed later when on to the same area certain contours and all the water-courses were inserted, and a further classification was obtained in relation to the 50- and 300-foot contours respectively.

This led to the grouping of the original villages into four classes—

- (1) Fen villages,
- (2) Fen-line villages,
- (3) River valley villages,
- (4) Upland villages,

so by this method of observation of the relationships that exist between the

village sites and the topographical features of the area, the separate and apparently unrelated facts have been classified.

Next, by considering the possible effects of the physical environment on the men who selected these sites and by calling in the aid of the geological formations, we arrived at a possible explanation of the classification. That is, the steps we have taken are—

- (1) Examination of apparently unrelated facts,
- (2) Classification, arrived at by observation,
- (3) Explanation of the classification,

which is an attempt to deal with the facts of human geography in a scientific manner.

A few years ago what was called scientific geography was introduced in place of the old mechanical subject which only trained the verbal memory, and by which we learnt a mass of unrelated facts. At first the new geography was only scientific in so far that we were taught, often unscientifically, the elements of the sciences, physics, meteorology, climatology, geology, chemistry, upon which geography was based. But today the claim is made, that geography is itself a subject that can be studied by scientific methods. One of the

basal elements of geography is location, and in this chapter an attempt has been made to show that this fundamental part of geography can be treated in a scientific manner even in the case of the sites of villages, and so it is not beyond the limits of geographical teaching either in town or country.

The Ordnance Survey of England and Wales publishes an index sheet (price 2*d.*) of each county showing the parish boundaries in relation to the survey maps of different scales. Such a sheet is not reproduced here, but is worth study from a geographical point of view, for in the case of Cambridgeshire it shows apparently a great mass of unrelated facts as expressed by the parishes being of almost all shapes and sizes.

Our next piece of work is to study some of these boundaries, and for this purpose reference must be made to Fig. 8, p. 34, on which a number of them has been inserted.

Beginning with the parishes belonging to the upland villages, we readily observe that there is a similarity in shape, although a difference in size, for they all are longer from north-west to south-east than they are broad from south-west to north-east; that is, they have roughly, a long

rectangular shape, most of them both beginning and ending between the same two parallel lines, one to the north-west almost coinciding with the Icknield Way and that to the south-east just beyond the watershed of the uplands.

The second point equally striking is that each parish, excepting West Wickham, consists of two kinds of land, boulder clay and chalk, that is, as interpreted in terms of vegetation, forest land and grass land, and in most instances these two varieties are in almost equal quantities in each parish.

It has already been stated that the Icknield Way is a pre-historic road, and therefore was in existence before the formation of the parishes. Historians are generally agreed that parish boundaries are lines that have been altered very little as a general rule since they were defined. As the Icknield Way is older than the boundaries, and as in some places they coincide with it, it seems strange that they do not coincide with it throughout its length. This, however, is probably explained by the fact that the old grassy roads of England were rather ill-defined, like roads in other grass lands of the world to-day, and that when the parish boundaries

were made they did coincide with the track then followed by the road, but the road possibly has been straightened at a more recent date, and this has produced the non-coincidence of road and boundaries as we see it on the map.

It will be noticed that the boundary between the parishes of West Wrattling and Balsham is named Fleam Dyke. This is one of several dykes in this neighbourhood that cross the grass lands from the upland forest to the fens, and their erection is attributed to the ancient Britons, who built them for defensive purposes.

They are certainly older than parish boundaries, and it is interesting to note that this line already existing on the surface of the ground was chosen as a boundary between two parishes. Again, the south-west boundary of Balsham parish coincides with an existing grassy road that is known locally as the Roman road.

It is pretty certain that this is part of the original road made by the Romans from Colchester to Leicester, the *Via Devana*, and hence was in existence and no doubt well defined as a straight track, as it is even to-day, when the parish boundaries were fixed. This road has been referred to on p. 20 as the Roman road that

crossed the Cam where Cambridge now stands.

If we examine the position of this road in relation to the topography we shall see that it runs along the crest of the high ground overlooking the Lin valley, in which the villages of Linton, Hildersham and Abington are located, and along the floor of which the present main road from Cambridge to Colchester is situated.

We have thus far gained the information that the parishes of the upland villages are symmetrically arranged with respect to one another, and consist of two kinds of land, well-drained chalk and wet clay; further, that they extend from the Icknield Way on the escarpment face to just beyond the crest of the uplands; also that while their boundaries are somewhat irregular they were evidently partly determined by pre-existing, well-defined marks on the ground, such as roads and earth mounds. The map shows us that in each case the village is situated near to the middle of the parish, and another point which should not escape our notice is the evident spirit of fairness which apparently controlled the subdivision of the area into parishes, as almost every parish receives equal quantities of the two kinds of soils. It would form an

interesting historical study to find out why West Wickham is confined to the clay. Was it cut off from Balsham parish for some reason that cannot be seen in simply a geographical survey?

Next let us direct our attention to the parishes in the upper Lin valley, Linton, Hildersham and the Abingtons. These appear to be orientated at right angles to the upland parishes, that is, their length is from north-east to south-west. Their north-eastern boundary is the old Roman road, running along the crest of the high ground overlooking the river valley, and from this they extend down into the valley bottom, across the stream, and up to the crest of the ridge on the opposite side. It is interesting to note that these boundaries are physical rather than artificial, and that the stream, which here is not wide, does not form a parish boundary. By this arrangement, which is another instance of an equitable subdivision, each parish gets a share of the valley meadow lands, of the uplands, and of the woods on the lower slopes, for in early times the lower slopes of the valley were well wooded, in fact, this is one of the best-wooded valleys in Cambridgeshire at the present time. The Lin valley, as already described in a pre-

vious chapter, is relatively narrow and steep-sided, and it seems probable that even if the Roman road had not existed the parishes would have had the same boundaries as they have, namely, from the crest on one side to the crest on the other side of the valley.

The fen-line parishes like the upland are remarkably similar to one another, all having their greatest length from north-west to south-east, and symmetrically arranged in relation to both the relief and the geology of the district. Practically each has its fenland and its chalk land, its lowland and its upland, and except where they become more irregular in shape near to Cambridge their north-western boundary is the river Cam. So each parish has its river frontage and its lode or canal by which the excess of water in its fenland can be carried into the river, and by means of which, in early days, its village was in water communication with the main artery. At the inland end of Swaffham lode, just between the two Swaffhams, is a small group of cottages which still goes by the "fantastic" name of Commercial End—a name, however, which speaks of the use of the lodes to these parishes in the Middle Ages. It should be noticed that the Cam valley

has here broadened out into the fen-lands, and the river itself is much broader than the Lin stream in the previous group of parishes, so the river forms a natural parish boundary to this group of fen-line parishes.

The fen-line parishes meet the upland parishes along the line of the Icknield Way, and the fact that not a single village is situated on this road cannot escape our notice. Newmarket is built on it, due north of Stetchworth, and in the south-west, Pampisford and the Abingtons are not far off. However, they cannot be seen from it, and so for 15 miles of its length it is a villageless road. If we examined this road beyond the limits of our map we should find that it retains this same character. We must remember that in early days it was a track in open grassy country along which people moved, people who perhaps were not always friendly to the settlers. Hence in addition to the reasons already given for the choice of settlements, either along the fen-line, below the Icknield Way, or on the forest edge above, we may see here another reason. In case of need either the fen or the forest would provide a refuge near at hand to the village settlers.

We are told that travellers in the

Balkan States have noticed that the villages are not situated on the main roads, but generally lie some little distance off them either to one side or the other. The reason given for this arrangement is that too often in the Balkans the main roads have been the routes along which armies have tramped. However, it is not necessary for us to go to the Balkan peninsula to find main roads without villages on them; we shall find several in southern Cambridgeshire besides the one mentioned here, and it may be that the reason is partly the same.

Having examined the boundaries of three groups of parishes in the area under consideration (fen parishes will be taken in the next chapter), we should notice that these parish boundaries, like political boundaries between states, can be classified as (*a*) natural or (*b*) artificial; further, as it has already appeared, an attempt is being made to apply general geographical principles in this study of a small region, we can see here that a small river performs the same function in delimiting parishes as some large rivers do between states.

There may arise in the mind the case of the Danube, how in its upper course the states of Bavaria and Upper Austria, for example, cross its valley

and occupy both banks extending from crest to crest, while in its lower course it forms the boundary between Roumania and Bulgaria, so here the parishes of Linton, Hildersham and the Abingtons in the upper Lin valley straddle the stream, while lower down the valley Bottisham, Swaffham Bulbeck, Swaffham Prior and others have the river for their parish boundary. The method employed in study-

ing these boundaries has been the same as that employed in studying village sites. The facts as shown on the map have been examined, classified and partly explained, for at least there appear to be some reasons why parish boundaries occupy the positions they do, as a consequence of the existing natural and artificial features in the district.

CHAPTER V

FEN VILLAGES IN RELATION TO RELIEF—DRAINAGE OF THE FENS— FEN PARISH BOUNDARIES

FEN villages and parishes now claim our attention, and in order to grasp the essential points we must examine another map. Fig. 9 gives a typical area of the Cambridgeshire fenland centring on Ely, and although separate maps are not shown as in the previous case, only a few of the details have been copied from the 1-in. ordnance survey map, so that it will be fairly easily analysed.

The relief first should be examined, and it will be found to agree with the description given in an earlier chapter, namely, that it is monotonously flat. However, it will be noticed that there is a group of the so-called islands, land over 50 ft. above sea-level, occurring in the neighbourhood of Ely, and when we isolate village sites from other details shown, it will be seen that generally with each of these islands there is associated a village or town site. Therefore as there is a

group of these islands in the south central part of the map, so here consequently the villages are near together, but in other parts of the map the villages are separated by long distances. (Villages beyond the Cambridgeshire boundary are not marked.) These more northerly villages, although on ground below the 50-foot contour, are situated on patches of gravel or clay that are higher than the surrounding land, and thus it is clear that all these sites are the best drained and driest spots in the midst of the fenland, in fact the only spots forming suitable areas for groups of habitations.

As reference will be made occasionally to the geology of the fen district, the map, shown in Fig. 11, based upon one in Miller and Skertchley's "Fenland Past and Present," will help us to understand the location of the villages. It will be seen that,

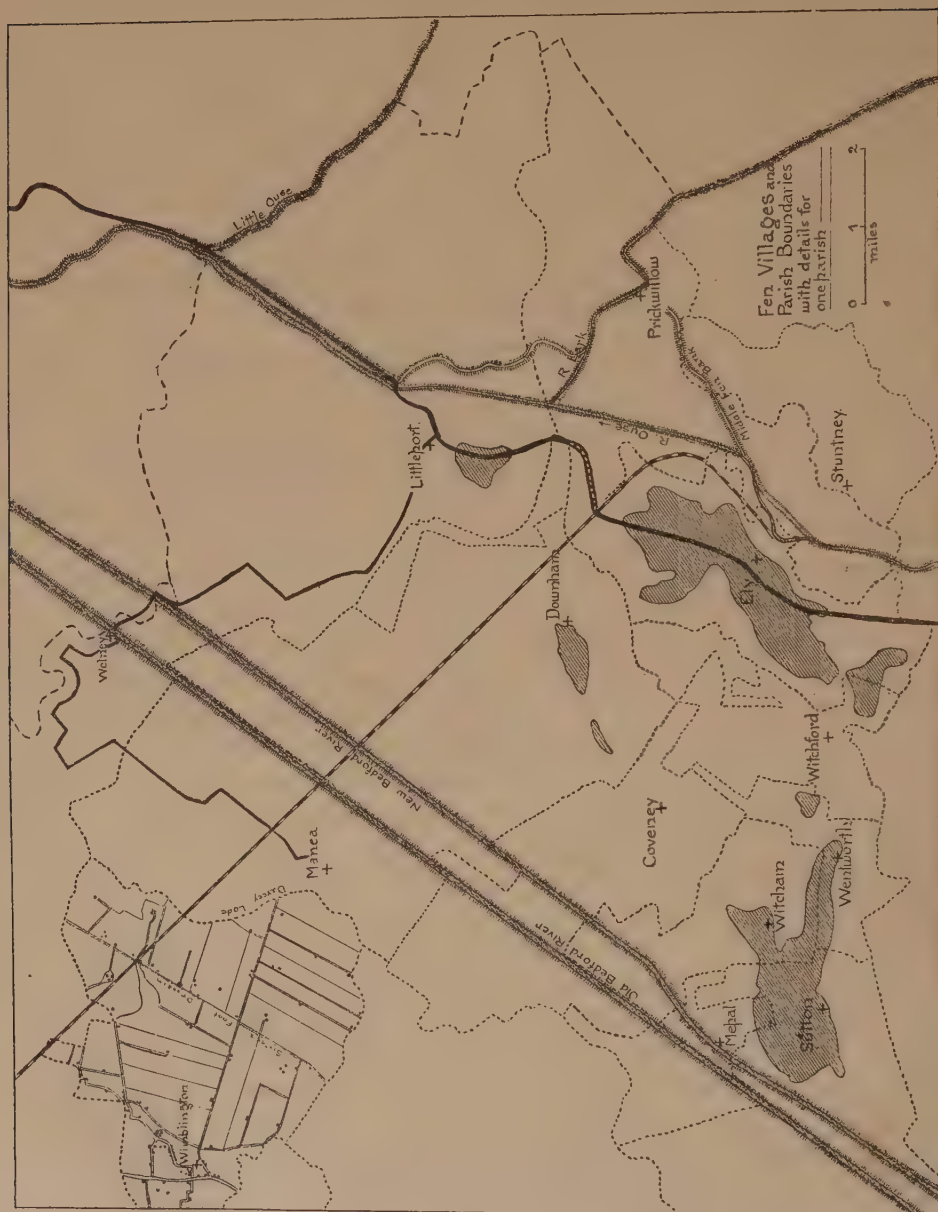


FIG. 9.—FEN VILLAGES AND PARISH BOUNDARIES. (With details for one parish.)
Based upon the Ordnance Survey Map with the sanction of the Controller of H.M. Stationery Office

broadly, the surface of the fens can be divided into two main areas, peat in the south and sea-borne silt in the north. Patches of gravel and clay, which form the islands of the fens, some of which are above the 50-foot contour and some below, are seen here and there, particularly in the peat area.

"The peat lands possess distinctive features which are very impressive.

gravel on the one side and the silt on the other is most marked." *

If we had examined a map which only showed the village sites, as we did in the previous chapter, we should have noticed at once their unequal distribution, namely, that in the south of the area they would have appeared near together, but in the north far apart, but the contour and geological maps show the reasons for this dis-

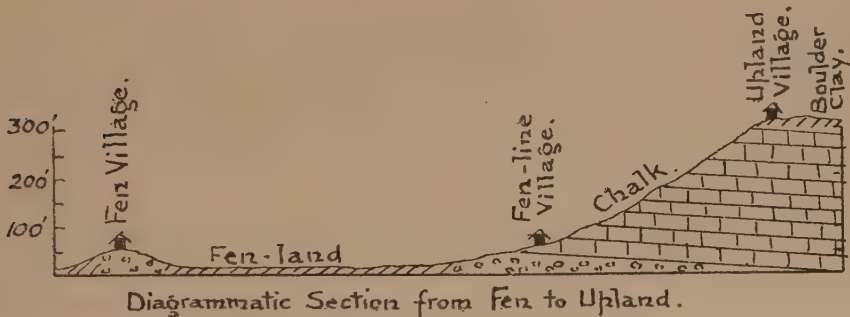


FIG. 10.

Not a town stands thereon ; the roads are perfectly straight ; the landscape is as flat as the open sea ; not a hedge-row breaks its monotony, neither does a tree appear save in the long lines of aspens which skirt the main drains. It is upon these black plains that the mirage is most frequently observed. The peculiar sense of openness which pervades the peatlands is very striking, and the contrast between it and the

tribution. Thus in contrast to the map of the country to the east of Cambridge all the village sites here belong to one class, fen villages, as a result of the uniformity in relief and drainage conditions. This is an example of a world-wide principle that uniformity in one set of geographical features produces uniformity

* Miller and Skertchly, "Fenland Past and Present," p. 561.

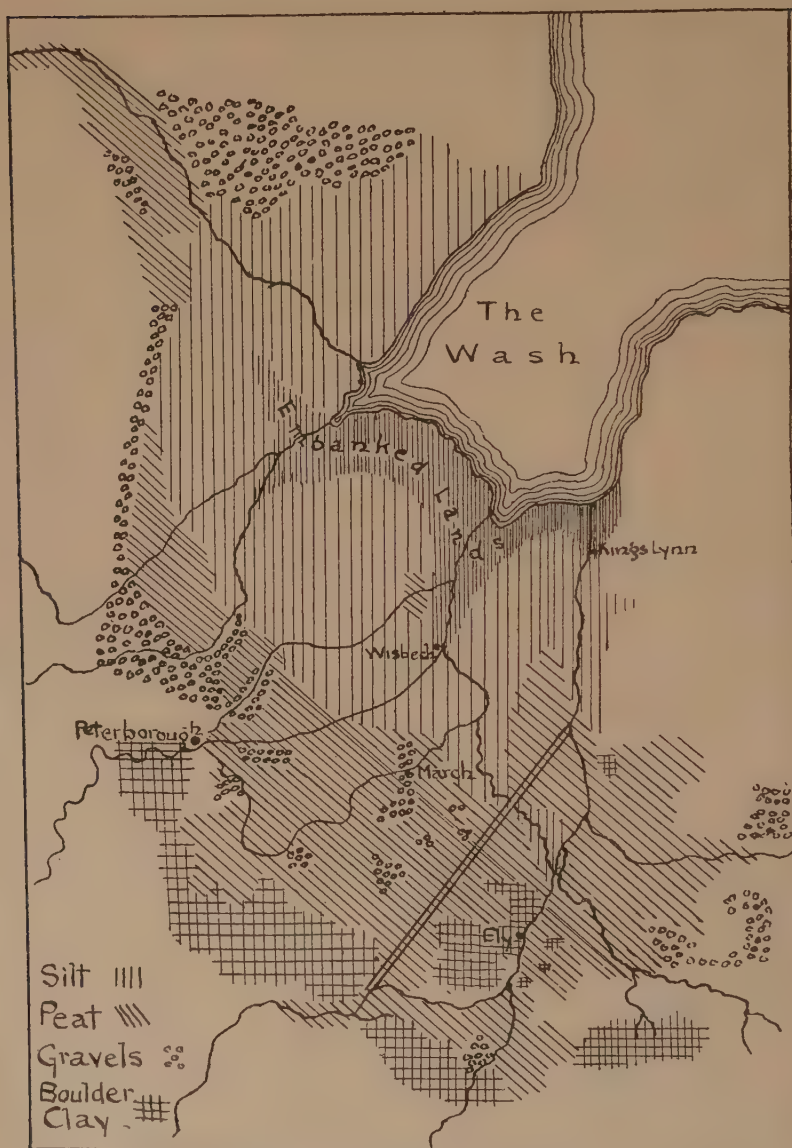


FIG. II.—GEOLOGY OF THE FENS.

in others dependent on it, while diversity in one leads to corresponding diversity in others.

Before considering parish boundaries in this area it is necessary to say something about the watercourses. On the map, Fig. 9, the chief stream, the Great Ouse, with its right-bank tributaries the Lark and the Little Ouse, has been marked, together with the chief drainage canals that are called the Old and New Bedford rivers. But in order to gain an idea of what the whole of the 1-in. ordnance survey map looks like some details of one parish, Wimblington, have been inserted. The single lines denote drains, the double lines show roads, and there is generally a drain or perhaps two along the roadside.

We notice that the rivers as well as the canals are embanked, so that generally in the fens you approach the water of a river by walking up its banks, instead of walking down to it as you do in most areas.

River courses in a low-lying land are very far from being straight in their natural state, and the difference between the natural and artificial water ways can usually be seen at a glance. Notice the rectilinear appearance of the artificial Bedford rivers, or the drains in Wimblington parish, and

contrast them with the curvilinear appearance of the natural river courses. The departure of the New Bedford river, near its southern end, from the straight-line course was clearly caused by the presence of the village of Mepal, which lay directly on its line. This New Bedford river was cut in the middle of the seventeenth century.

We will now examine the part of the Great Ouse that is shown on the map. If we look to the east of Ely we see an embankment, called the Middle Fen Bank; follow it to the village of Prickwillow, then for a short distance along the river Lark, and then by a devious path to join the Ouse again just to the north of Littleport. Between Ely and Littleport we notice that the Ouse flows along a straight course, but it was only a hundred years ago that this straight cut was made.

Previous to 1827 the course followed by the river was the one by the embankment round by Prickwillow. The embankments and the old bed still remain, but the main part of the river flows in the new channel.

There is direct historical evidence that at one time the Great Ouse did not flow between Littleport and the place where the Little Ouse now joins it on the Cambridgeshire boundary,

but that it followed a course to the north-west from near Littleport past Welney and on to Wisbech (Ousebech) further north beyond the limits of our map. This historical evidence is supported by geological, that can be easily gathered from the geological map. The map shows us that the most southerly point to which the silt extends into the peat lands, is where the Lark enters the Great Ouse. This at one time was evidently an estuary, and the land waters which entered it were the rivers Great Ouse and Lark, which continued to flow in this direction even when their estuary had been silted up, as the estuary of the Cheshire Dee is being silted up to-day.

It is not the purpose here to give the history of the fen drainage. It can be obtained from "Fenland Past and Present," already mentioned, or from Conybeare's "Highways and Byways of Cambridgeshire," but perhaps sufficient has been said to show that in the drainage of the fens some watercourses have been straightened, new ones cut, old ones abandoned, and that the present watercourses are characterised by their almost infinite number and general mathematical straightness.

The presence of all these water-

courses is not without its geographical significance, especially in their effect upon lines of communication. For example, from the village of Manea we can see the towers of Ely cathedral, barely 7 miles away, but to reach Ely we have to travel almost three times that distance by the main road, which is marked on the map.

In contrast to this zigzag road, one railway line has been inserted to show how straight are the railways in the fens where no obstacles except the drains have to be overcome.

Now let us look at the parish boundaries. There is no symmetry here, as we found in the map showing the upland parishes, but rather they form an excellent jig-saw puzzle, for all of them are almost equally irregular. It has previously been stated that uniformity in one geographical factor leads to uniformity in others based upon it.

The uniformity in the nature of the surface of the fenland has, partly at least, produced the uniform irregularity in the shapes of the parishes.

In the southern part of the area where villages are numerous, owing to the presence of islands, the parishes are relatively small, while further north, where the villages are miles

apart, owing to absence of suitable sites, the parishes become correspondingly large. Look at Downham or Littleport parish, for example.

It would seem that in the absence of other geographical features, the boundaries were usually formed by either natural or artificial waterways, and we can see quite easily how some were rectified by the cutting of the Bedford rivers, for this is the only place on the map where the boundaries are anything like regular.

The only road marked on the map, besides the one from Manea to Ely, is the main road from Cambridge to King's Lynn passing through Ely and Littleport. This, historians say, was a Roman road. It is interesting to note, however, that it is not used as a parish boundary except for about half a mile in the south of the map, and

again for about a mile between Ely and Littleport.

We have already seen that the pre-historic Icknield Way and the Roman road up above the Lin valley were used as parish boundaries, and we shall find other old roads that were similarly used in another area. One suggestion why this road was not so used is, that it may have fallen into disrepair, or even have disappeared in the marshes, between Roman times and the times when these parish boundaries were fixed. A piece of historical evidence which supports this suggestion is, that when William the Conqueror made his attack upon Hereward in the Isle of Ely, although Cambridge was his headquarters, he penetrated into the fens not along this road but by a route further to the west.

CHAPTER VI

VILLAGES AND PARISHES TO THE WEST OF CAMBRIDGE IN RELATION TO (a) RELIEF, (b) ROADS

THE villages and parishes to the west of Cambridge remain to be studied, and an examination of their sites and boundaries will disclose some points both of similarity and contrast to those already studied. Fig. 12 is a map of these villages in relation to the contour lines, streams and main roads. The area is almost the same in size as that in Fig. 5, p. 28, and the number of villages, forty, is also the same, which shows that both to east and west of Cambridge the distribution of villages as regards average distance apart is remarkably similar. An examination of their names shows us that while there are no less than eighteen "tons," no other termination is common. There is a group of three "worths" in the north, three "leys," two "wells" and two "dens," but others have only single representatives. Strangely enough, there is not a single "ford," although six of the villages,

five of which are "tons," are near to the Cam. In this area, therefore, the names give little or no clue to a classification, and we must examine the relief.

The Cam valley occupies the south and east of the map, and in the middle west is the small plateau over 200 ft. above sea-level already briefly described on p. 16. The two ridges which stretch out towards the east form the northern and southern boundaries of the Bourn valley. The ridge to the south is much narrower than that to the north, which on its northern face slopes down towards the fenland.

The valley of the Bourn has already been described as having both sides very similar as regards their gradients, and the stream occupies the middle of the valley.

It should be noticed that this valley, cut into the uplands, is much broader

than those cut into the uplands on the east of Cambridge. Further, it is apparent by the numerous small

streams present in this area that it is different from the dry chalk lands to the east. The watercourses marked

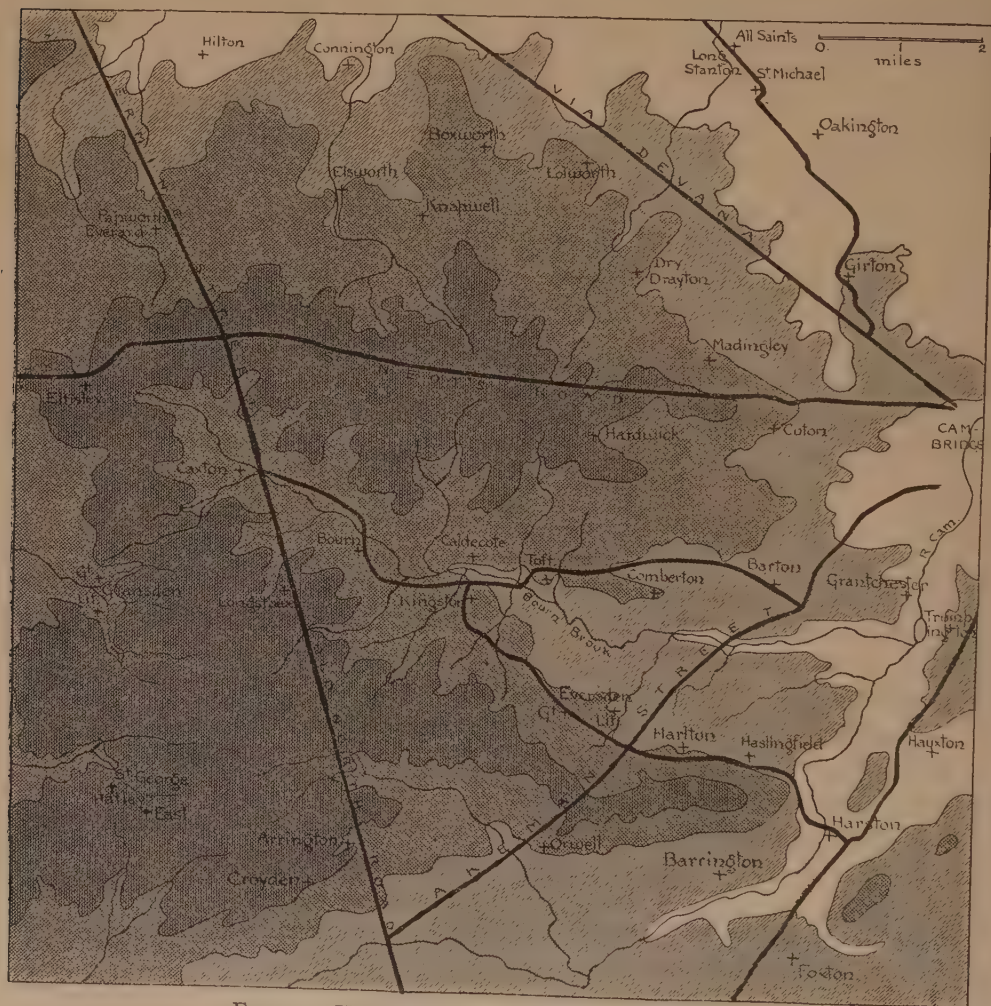


FIG. 12.—VILLAGES TO THE WEST OF CAMBRIDGE.

Based upon the Ordnance Survey Map with the sanction of the Controller of H.M. Stationery Office.

are all taken from the 1-in. ordnance survey map, but it must not be imagined that they are rivers. Most of them are only a foot or two in breadth, but even if small their presence marks out this district as quite different from that on the other side of Cambridge.

The relationship between the village sites and the contours is plainly seen. Follow the 100-foot contour line round from the north-west of the map down to the south-west, and no less than eighteen of the forty villages will be found practically on this line. By examining the 200-foot contour, nine villages will be found very near to it. Eleven are situated near to the 50-foot contour either as valley villages near the Cam, or fen-line villages near the fens, leaving two, Caxton and Bourn, in the upper valley of that stream, between the 100- and 200-foot contours. The valley, fen and fen-line villages have already received attention in earlier chapters, but the 100- and 200-foot contour villages in this area need examination, for it should be remembered that to the east of Cambridge, the upland villages were found near to the 300-foot contour.

As throughout our study of Cambridgeshire we have referred to land above 50 ft. high as upland, in dis-

tinction to fenland, we shall still call these villages by the same name. Thus, according to relief, the villages to the west of Cambridge can be classified as before into fen-line, fen, valley and upland villages.

The chief roads of the area are also shown on the map, and they, with a little inspection, admit of classification into two groups.

Across the western side of the map in a direction not far removed from north to south runs the present-day representative of the Roman, Ermine Street—the old North Road.

The characteristics of this road as gathered from the map are, (1) its straightness, (2) its nearness to the line of water-parting on the plateau and (3) the absence of villages along it. Arrington, Longstowe, Caxton and Papworth Everard are near to it and have expanded towards it in relatively modern times. Branching off Ermine Street towards the north-east near the southern boundary of the map is the Roman road called Akeman Street which passes through Cambridge on to King's Lynn.

Similarly to Ermine Street only one village, Barton, is on this road, and it will be noticed that even in this case the church is some little distance away.

The third road to examine is St. Neot's Road, running almost due west out of Cambridge and following pretty closely the watershed of the ridge on the northern side of the Bourn valley. This is a remarkably straight road, and there is not a single village situated on it until we come to Eltisley, 12 miles out of Cambridge. Still further to the north is the Roman Road, Via Devana, with the same characteristics of straightness and absence of villages. It follows the fen-line pretty closely, and the first village we come to is Fenstanton (beyond the boundary of our map), 10 miles from Cambridge.

The remaining roads are clearly roads joining the villages, three of them valley roads, and the one in the north-east, on the edge of the fens, and so the classification of these roads into those which do, and those which do not join villages is fairly clear.

Further, a relationship in pairs exists between the roads in these two classes. The Via Devana and the road still farther to the north-east, Akeman Street and the one through the Cam valley, St. Neot's Road and the one from Barton to Caxton, and lastly, Ermine Street and the road from Kingston to Harston, are approximately parallel to one another in pairs.

The plan of the roads in the Bourn valley is of interest, as it is so clearly defined by the position of the villages. In the lower part of the valley, these are situated some distance up the valley side, evidently avoiding the stream, while further up, when the lowest part of the valley is not less than 100 ft. high, the villages are near to the stream, and the roads unite. Thus the plan is an irregular Y.

A partial explanation at least of some of the facts we have noticed with respect to the classification of roads and the location of the villages can be obtained by an examination of the map given in Fig. 13.

The principal geological formations are shown to be gault, a clay underlying the chalk beds, and which comes to the surface on the floors of the valleys; succeeding this, a narrow strip of lower chalk of varying width, which appears on the lower slopes of the valley sides, while the greater part of the uplands is covered with boulder clay.

It will be remembered that to the east of Cambridge the fen-line villages are situated on the 50-foot contour at the foot of the chalk, and it was stated that the chalk strata dipped slightly to the east or south-east. From this it at once follows that if beds of chalk

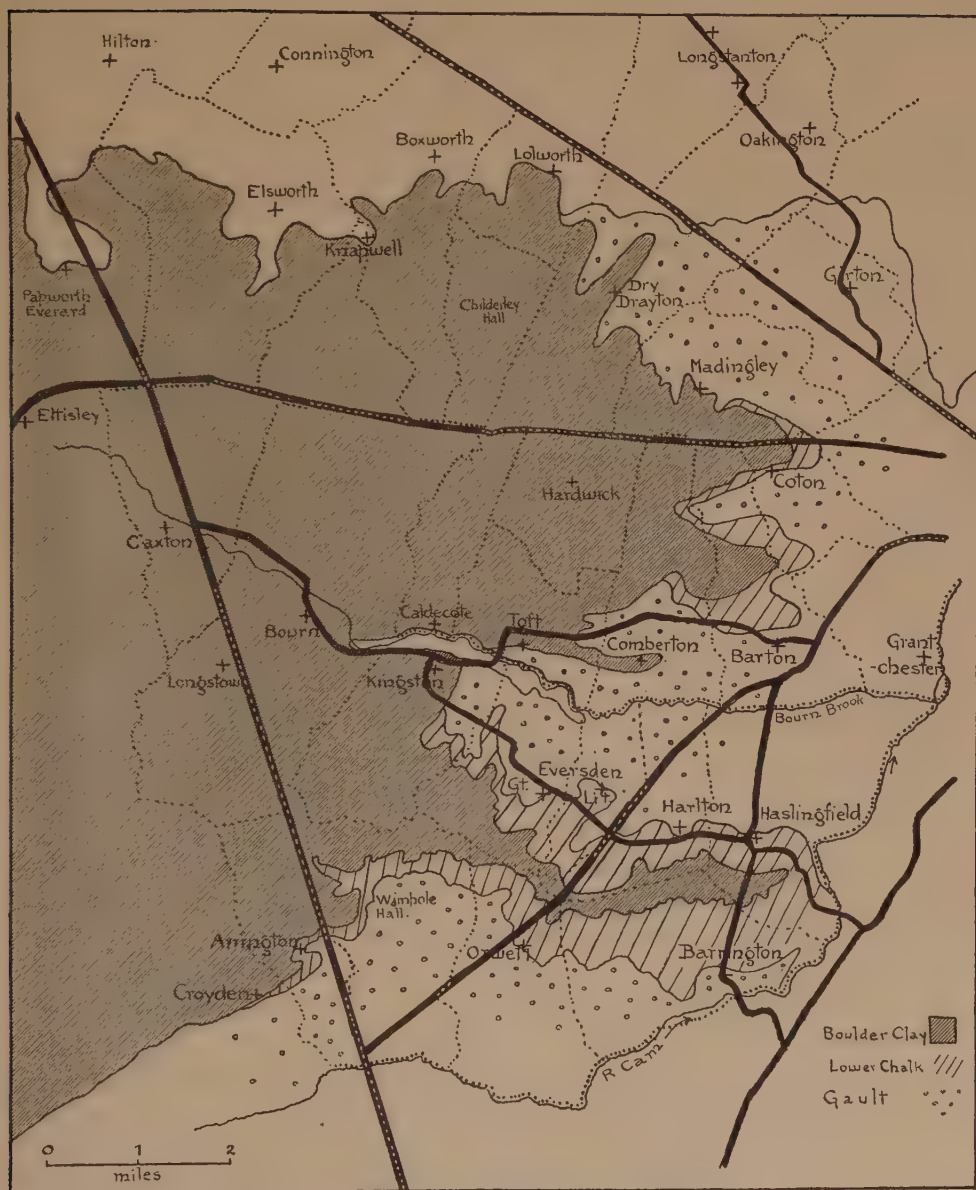


FIG. 13.—PARISHES TO THE WEST OF CAMBRIDGE.

Based upon the Ordnance Survey Map with the sanction of the Controller of H.M. Stationery Office.

occur further to the west, they will be at a higher horizon owing to this slight inclination towards the east. They occur as indicated on the map, and thus the villages in the Bourn valley situated on the lower chalk are on the 100-foot contour instead of the 50-foot. The reasons for the location of these villages, particularly those to the south of the stream, appear therefore to be somewhat as follows: First, water from the springs at the

To-day most of the forest land has been cleared, but several patches remain, as can be seen on the ordnance survey map, and most of the valley floor has been cultivated although near to the stream thickets are still to be found in some places. The 100-foot contour line in this valley, therefore, appears to provide the most suitable sites for habitations, and here man by the force of circumstances was led to found the villages which are so

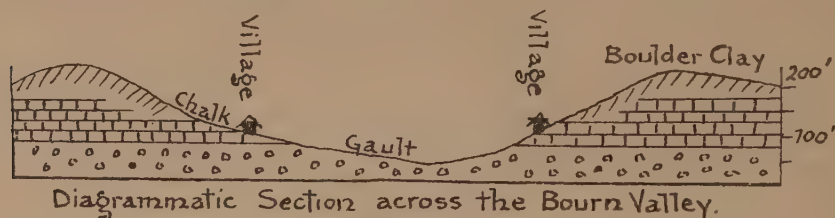


FIG. 14.

foot of the chalk would be available, and the stone, locally called clunch, from these beds affords material for building. Secondly, these sites would be drier than on the gault in the valley bottom or on the boulder clay above. They would consequently be more healthy and more open. No doubt in early times the valley bottom would be thick with reeds and bushes and the boulder clay areas would be forested. Wood for building, reeds for thatch, fuel for fires and animals for food—all would be near at hand.

symmetrically arranged along the sides of the valley.

To the north of the St. Neot's Road and between it and the Via Devana there is a line of villages, Madingley to Elsworth, not only situated on the 100-foot contour, but, as this map shows, on the edge of the boulder clay, which in this part of the map almost coincides with this contour. At Madingley and Dry Drayton gault borders the boulder clay, but further to the west, at Lolworth, Boxworth, Knapwell and Elsworth, patches either of greensand

or gravel border it, and no doubt formed an important factor in the choice of these village sites. Reminding ourselves of what has already been said about the forests which grew on the boulder clay, we can appreciate the choice on the edge of the forest rather than in the forest itself.

North of the Via Devana, the villages are situated on patches of gravel or greensand, but no attempt has been made to show the surface geology here as it forms a patchwork of various deposits for which the reader should refer to the geological map of the district.

A few villages such as Hardwick, Eltisley, the Gransdens, the Hatleys, Croyden, Arrington and Longstowe are situated near the 200-foot contour on the boulder clay. Croyden and Arrington are just where the lower chalk gives out between the boulder clay and the gault, and thus have a similar site to the villages in the Bourn valley although at a higher level.

It thus appears that these villages were often located on the slopes of the high lands rather than on the crest. It will be seen that there are large areas of the land over 200 ft. high destitute of villages, but these are boulder clay areas and not chalk as to the east of Cambridge, and therefore

absence of water would not be the factor which prevented the foundation of villages. Surface water would be plentiful, but probably the bleakness of the uplands, together with the forest growth on the boulder clay forced men to choose the lower slopes, where the forests thinned out and more open vegetation took its place.

We will now examine a few of the parish boundaries in relation to both the natural and artificial features in the area.

The first thing we notice is that some of the roads throughout almost the whole of their length form boundaries to the parishes. Commencing with the Via Devana, we see that with the exception of Girton parish, which crosses the road, all the parishes to north and south are separated by it. The St. Neot's Road also is a boundary between parishes.

Sometimes the boundary is on one side, sometimes on the other, but the road for every foot of the way for 7 miles divides the parishes sloping down to the north, from those sloping down to the Bourn valley. It should be kept in mind that this road follows pretty closely the line of water-parting on this part of the plateau.

Ermine Street also forms the boundary between parishes for a

considerable part of its length, but in such a case as Caxton the parish overrides it. On the other hand, Akeman Street is seldom used as a boundary. Now there is no doubt that the Via Devana and Ermine Street were Roman roads, that is, they were in existence before the parish boundaries were made, and it would seem that these roads were definitely selected to fulfil this purpose. The St. Neot's Road, however, is not claimed by historians for a Roman road, but from the fact that it forms such a continuous boundary between parishes, it may have been in existence before these were fixed, and so it must be an old road.

On the other hand, it may be argued that the boundaries were fixed along the line of water-parting, and the road was cut later along this same line. At the time when the parishes were made no doubt much of this plateau was forested, and perhaps, at least, a path led through the forest along the driest track, and this path, which has now developed into one of the main roads of the county (Cambridge to Bedford), was chosen as the line of division.

Akeman Street is Roman, but it might have fallen into disrepair at the time when parishes were formed as no

doubt it had to the north of Cambridge, and further, it cuts across the natural features more than it follows them, and so it neither divides parishes nor connects villages. The remaining roads are evidently more recent in construction, for nowhere do they form parish boundaries, and no doubt they were made along the paths between the villages after these had been established.

The second thing to notice is that the Cam, and the Bourn brook in its lower course, are used as parish boundaries for the greater part of their length, while another good example of a natural boundary is the crest line of the ridge of hills to the south of the Bourn valley.

Turning now to the parishes themselves, we find that in many instances, as in the east of southern Cambridgeshire, the village is situated near to the centre of the parish, and that generally each parish has a variety of soils.

In the upper Bourn valley, Caxton and Bourn parishes straddle the stream and extend practically from crest line to crest line, as in the upper Lin valley, p. 40. Lower down the stream as the valley widens and the crest lines are further apart, the parishes extend from the crest line

down to the stream in the valley bottom. Similarly on the southern slopes of the south ridge the parishes of Barrington, Orwell and Wimpole extend from the same crest line down to the River Cam. Although the parishes vary considerably in size we see that there is a certain amount of symmetry in their arrangement, that their shapes are controlled by the relief of the land and that their boundaries are fixed sometimes by natural and sometimes by artificial features.

It must not be assumed that we should find so much regularity and symmetry in the location of village sites and parish boundaries in all English counties as we have seen in Cambridgeshire.

The foundation of these distributions is to be found in the regularity of the geological structure. Where there has been but little disturbance of the strata, the resulting uniformity in the distribution of the rocks gives rise to uniformity in the different geographical distributions which depend upon it.

Perhaps, therefore, Cambridgeshire offers more possibilities by the method adopted than some other English counties, and the diversity in English geology will give rise to much diversity in other factors, but at the same time there are many other areas in England besides Cambridgeshire which will give similar results.

CHAPTER VII

PLANS OF DIFFERENT TYPES OF VILLAGES—PLANS OF UPLAND AND FENLAND PARISHES

As we have been able to classify Cambridgeshire villages into four groups according to their physical environments, we will now examine the villages themselves and note any characteristic contrasts between them. For this purpose four plans are shown in Fig. 15, which have been prepared by enlarging the plans of the villages as given on the 1-in. map. Although, of course, no two villages are exactly alike in all details, the villages chosen can be taken as typical of those belonging to the group from which they are taken.

The first is Grantchester, a river valley village, situated 2 miles to the south of Cambridge. We first of all notice that this village is built all on one side of the river. Where the road crosses the stream the land is only 30 ft. above sea-level, but on the bank on which the village is built it soon rises to over 50 ft. ; and it is

here, out of reach of flood waters, that the houses are placed. We notice that the village road is not straight, the zigzags make the ascent from the mill easy, and the houses are arranged principally along the two sides of this road. This makes the village rather long, and the buildings are not grouped round some common centre. The village has a corn-mill on the stream, worked by a mill dam into which the water is diverted, and the height controlled, by the sluice gates shown in the south of the map. Most of these characters are repeated in other valley villages in the south of Cambridgeshire. The site on high ground on one bank of the river, the length of the village, and the mill worked by the stream, these facts can be taken as characteristics of this type of village.

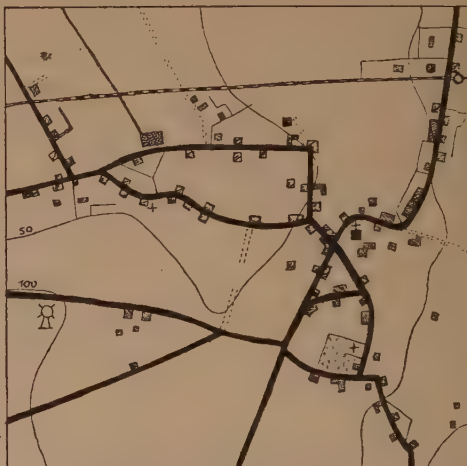
That the Romans had a camp or village here, as its name suggests, is partly supported by certain remains

which have been recently discovered and described as Roman. Lower

down the river just beyond Cambridge is the village of Chesterton,



The Valley Village - Grantchester.



The Fen-line Village - Fulbourn



The Fen Village - Manea.



The Upland Village - Weston Colville

mile. $\frac{1}{4}$ $\frac{1}{2}$

FIG. 15.—TYPES OF CAMBRIDGESHIRE VILLAGES.

Based upon the Ordnance Survey Map with the sanction of the Controller of H.M. Stationery Office.

and it is said that Grantchester and Chesterton were the sites of the outer defences to a Roman station where Cambridge now stands. There is, however, much uncertainty about this, as the names both of Cambridge and Grantchester have changed considerably during historical times.

Grantchester mill is referred to in Chaucer's *Reeve's Tale* in the following lines :—

“ At Trompyngtoun nat far fro' Cantibrigge
There goeth a brook, and over that a brigge
Upon the whiche brook ther stant a mille
And this is verray sothe that I you telle ” ;

and shall we say Grantchester has again been immortalised by Rupert Brooke in his poem bearing the name of this village ?

The material used in the construction of the cottages and other buildings often brings out points of geographical interest. Especially is this so in the case of old buildings, that were erected before modern means of transport enabled men to bring in building materials from a long distance. Thus the church is often an expression of the geological resources of the district.

Grantchester church is built of clunch and rubble, with stone quoins and buttresses. Clunch is a poor building stone, very soft, obtained

from the lower chalk in the neighbourhood, and the fact that it together with rubble is used speaks of the scarcity of good local building material. The fact that stone is used for the buttresses suggests that the walls need support, and that only small quantities of it were available to strengthen the weak local material.

Turning to the plan of Fulbourn, a fen-line village, several points of difference are at once recognised. The village is more compact. It is built at the foot of the slope which we see rising at the back of the village to 100 feet, on the summit of which the windmill is built so as to catch all winds.

At this mill there is a well 74 ft. deep, while in the village itself the wells have a depth of about 20 ft. This at once partly explains why the village is at the foot instead of on the hill. Standing on the hill and looking to the north-east, the village is seen immediately in front at the foot of the slope, many of its cottages still with whitewashed walls and thatched roofs, while away towards the north the flat open land of the fens stretches to the horizon.

Fruit trees in the gardens, and some deciduous trees on the roadside form an element in the village picture in

contrast to the treeless windmill hill and the chalk downs behind. The "bourn" is a little further to the east, just beyond the border of the map, and a contest is waged round the name of the village, as to whether it was originally "full-bourn" or "foul-bourn." Supporters of the first of these suggested origins claim that the Bourn has never been known to run dry even in the driest season, but is always full of clear water. Recently, however, it has been dry, but this was caused by the erection of a new pumping station still further to the east in connection with the Cambridge town water supply.

Fulbourn church is built of imported stone as there is no suitable material near at hand.

The upland village, Weston Colville, evidently shows some signs of being in a clearing in the forest, for large patches of forest land still remain, a strong contrast to either of the other villages shown on this map. The houses are built along the main road as in Granchester, and the contours indicate the position of the village on high land, a striking difference between it and the other three.

An old windmill perched on the highest point of cleared land and in the centre of the village has its points

both of similarity and contrast with the Fulbourn mill. That is, water-power being absent, the wind had to be used as the motive power for grinding the corn, but while the mill at Fulbourn is outside the village in order that it might occupy the most exposed position, Weston, being situated on high ground, has its mill in the centre of the village. The village is smaller than either of the other three, being further from the larger centres of the county and away from the most frequented routes, but reference to Fig. 8, p. 34, will show that its parish is above the average size of these upland parishes.

In early times sufficient water could be obtained from the clay surface, but to-day some deeper wells have been sunk, right through the chalk. These are nearly 200 ft. deep, and are therefore both difficult and expensive to dig. Reference might be made to the diagram on p. 45.

The simple features of this village appear to be in keeping with its upland position and an expression of its physical environment. The church is built of flints set in mortar. The upper chalk is in many places full of flints, which have for a long time been used as building material in many of these upland villages. However,

square corners cannot be made with such material, so stone has to be used for corners and window openings. In some cases sufficient stone could not be procured, so a round tower is built instead of a square one. A few such round towers can be seen in Cambridgeshire upland villages, a fact which provides us with an example of local architecture being an expression of the local geology.

The fen village of Manea is the fourth and last of the series. Not a single contour as given on our maps disturbs the surface, that is, there is no point in the village 50 ft. above sea-level. The ground is so flat that it is said the curvature of the earth can be observed by looking along the railway from Manea station at an approaching train. There is a stretch of $2\frac{1}{2}$ miles to the north-west without bend or gradient, and as the train approaches Manea the funnel of the engine first comes into sight, like the mast of a vessel approaching the land.

The patch of ground upon which the village is built consists of a cap of gravel slightly higher than the surrounding peat, and so giving a firmer foundation and a better drained surface. The compactness of the village is an expression of these conditions. Drains are seen on all sides

surrounding the village site to carry off the water. In contrast to the upland village there is no trace of woodland, although trees are to be seen in some places bordering the drains. Two windmills remain, to remind us of the use to which these were put in lifting the water from the drains out in the fens into the canals raised above the level of the ground, which carried it into the rivers. To-day in many places, steam pumps have replaced the old wind-driven pump, because occasionally the wind failed just at the time it was most required. The same change is being made in Holland. The windmill, so characteristic an object in a Dutch landscape, is being replaced by the more unsightly chimneys of the steam-driven mills.

The name of the village must not escape our notice. The termination *ea*, sometimes *ey* or *y*, signifies island, and many of the fenland village names speak of the undrained fens, when these patches, slightly above the surrounding land, were the only sites at all possible for the position of a village.

The church is modern and built of imported stone, as naturally the fenland does not produce stone for building purposes.

Other villages of Cambridgeshire

have their points of geographical interest, of which we will mention two. As an example we will first take the following. At the northern end of the fen-line, as shown on Fig. 6, p. 30, stands the village of Reach. To-day this is very small, a collection of a few houses, strictly not even a village, for its church is only a mission church attached to Swaffham Prior; but this hamlet is not without its significance. First of all, as shown on the ordnance survey map, it is built at the fen end of the Devil's Dyke, an ancient earthwork extending, like the Fleam Dyke and parallel to it from fen to forest, right across the open grass country of the chalk. At the forest end of the dyke is Wood Ditton (ditch-town), one of the upland villages. It may be that Reach, although without a parish, is much older than many of the other settlements of the area. It may possibly have been the site of a British settlement, guarding the end of the dyke. But the map also shows us that Reach has its lode or canal extending from the end of the dyke down to the Cam at Upware. This is a very old lode, and Conybeare, in "Highways and Byways of Cambridgeshire," tells us that in early times its hithe or quay was a busy place, so that in early days Reach was

an inland port. It had a celebrated fair, and even to-day one of the duties of the mayor of Cambridge is to go and declare the fair open. We can safely conclude that this village was once far more important than it is to-day, for now it is the smallest of the settlements along the fen-line in this part of Cambridgeshire. This gives us an example of a "decayed" village due to the changing circumstances of the centuries.

We know examples of what are called "dead" towns, the old Roman towns of the lower Rhone valley as Avignon and Arles, or Virginia City in the State of Nevada in the Western United States—towns which at one time were busy centres of life, commerce and industry; but owing to changes over which they had no control, the forces which produced them have ceased to operate, and to-day they are but ghosts of their former selves. The same geographical laws are seen in operation on all scales, and in this example of Reach we see how to-day even a village may not only cease to grow and expand, but how it may become smaller and of less importance, as the things which brought it into existence and nourished it, are diverted into other channels or lose their original importance.

To take an example of a different type, we may mention the following, to show how the plan of a village is dependent upon its site. By reference to Fig. 16, p. 73, it will be seen that the boundary between Cambridgeshire and Norfolk to the south of Wisbech is a very meandering line for a distance of about 10 miles. This is the course of an old river, called the Well stream, and at one time was one of the channels of the Great Ouse, before it was diverted (previous to the thirteenth century) into its present channel northwards towards King's Lynn.

This has already been referred to on p. 47. This stream had been embanked, and to-day for a distance of 5 miles on both sides of the river, that is, along the old embankments, there is an almost continuous row of houses, which forms the villages of Upwell and Outwell, partly in Norfolk and partly in Cambridgeshire. It is seldom that the houses extend into the fields away from the road, for it is just along the river-side, where the land is slightly higher than the surrounding fen, that the best sites are obtained, so that here we have what is commonly described as the longest village in England, a village with length but no breadth.

There is one remaining feature on the maps already examined that deserves our consideration. On Fig. 8, p. 34, and Fig. 9, p. 44, it will be seen that details have been inserted for two parishes, an upland parish, Balsham, on Fig. 8, and a fen parish, Wimblington, on Fig. 9. The two maps are drawn to the same scale.

The principal points of contrast in these two parishes beyond those already noted are as follows. The parish of Wimblington is intersected by a rectangular system of roads and drains. The single lines denote drains and the double lines roads, and there is often a drain along the roadside. Drains are absent, and roads are only few in number in Balsham parish. In the fen parish it will be seen that there is a large number of isolated farms (marked by small squares) suggestive of the way in which the land is subdivided, but Balsham parish has a few farms which are relatively large. No doubt water is again one of the controlling factors. On the fens, water that is used for drinking and domestic purposes is obtained a few feet below the level of the ground, the wells are only 6 to 8 ft. deep, while on the chalk lands of Balsham water is far below the surface, and it takes a considerable amount of skill and the

cost is high, to sink a well from which water can be obtained in sufficient quantity for domestic purposes. The wells on the farms on the chalk lands of Balsham parish are nearly 200 ft. deep, and when we remember that surface water is absent, we can easily understand how in early days it was impossible for villages to be founded here.

Drains take the place of hedges in the fens, and so the passage from one field to the next is much more difficult than in Balsham parish. In this parish hedges are inconspicuous, sometimes absent, and sometimes rows of trees or narrow belts of plantations form the boundaries between the farms.

French geographers when writing about their own country generally describe with much detail the different ways in which man's occupation of the land, whether on plateau or on plain, on hill or in valley, is controlled by local conditions. Thus they distinguish, for example, the farms and villages in Picardy, Champagne, Brie and Beauce according to their sites, whether on plateau level or valley bottom. It seems that the same factors are at work here in the county of Cambridgeshire, and of course in other English shires, but English geographers have not paid so much attention to this view of the subject.

Is it because France is still a great agricultural country while England is industrial and commercial? But if the function of geography is, as described by Sir Halford Mackinder, "to train us to imagine, accurately, conditions of life in other lands," then surely we can train this imagination more accurately by examining and observing our own countryside and noting the same geographic controls at work here as elsewhere, than by neglecting what is at our own doors.

Many claims are brought forward to-day to justify the inclusion of the study of geography in the curriculum of schools and colleges, not only for its utilitarian value but also for its value in mental training and general education. These claims are sound; but if reasons are learnt mechanically from books without the necessary and possible observation, the claims made fall to the ground and are not fulfilled.

Already comparisons have been made in previous chapters that may appear to be "far fetched," but they are made on the assumption that by careful observation of the things around us, although these may be on a small scale, we shall be laying foundations upon which we can build mental pictures of things beyond the reach of our direct observation.

CHAPTER VIII

CHIEF OCCUPATIONS IN CAMBRIDGESHIRE—AGRICULTURE AND INDUSTRIES DEPENDENT ON IT—OTHER INDUSTRIES

Agriculture.

FROM what has already been said about the farms and villages in our county and the absence of large towns, it will readily be inferred that it is an agricultural area. This fact becomes emphasised all the more when a few comparisons are made. From the statistics published by the Board of Agriculture and Fisheries, we find that out of every 1000 acres of land in the county, Cambridgeshire has 679 acres described as arable land, Lincolnshire 584 acres, Huntingdon 530 acres, Cornwall 363 acres, Kent 300 acres and Shropshire 258 acres. There is no other county in England with such a high percentage of cultivated land, but many counties have a much larger proportion of meadow and grass land.

When we remember that two-thirds of the county is fenland, that

is, reclaimed land, land that before it was drained was a morass and useless for agriculture, then we can appreciate man's work in his struggle with nature. We can perhaps get a better perspective by imagining the conditions if this work of draining had not been carried out, for then Cambridgeshire, instead of heading the list, would be very low down with two-thirds of its area ranking as waste land. So we can reasonably pay our tribute of gratitude to the men of former times who undertook and carried out this great work, even if they did not always do the best that might have been done, which is the opinion of some who pass judgment upon the fen drainage in the light of present-day experience and knowledge.

The general characteristics of English agriculture as regards the crops grown need not detain us, but a few points of contrast between the

products of fenland and upland deserve our attention. The following table obtained from the source already mentioned furnishes some interesting comparisons. It must be explained that, for administrative purposes, the geographical county of Cambridgeshire is divided into two parts. The northern one, called the Isle of Ely, occupies three-sevenths of the county area, and is composed entirely of fenland, while the southern part, the remaining four-sevenths, is partly fen partly upland.

	In every 1000 acres there are in	
	The Isle of Ely	The rest of Cambridgeshire
Wheat ..	233 acres	200 acres
Barley ..	68 "	86 "
Oats ..	94 "	81 "
Beans ..	24 "	39 "
Turnips and Swedes ..	2 "	29 "
Potatoes ..	132 "	15 "
Small Fruit ..	25 "	8 "
Clover and other grasses under rotation ..	24 "	195 "
Permanent Grass ..	220 "	197 "
Cattle ..	120 head	84 head
Horses ..	70 "	45 "
Sheep ..	87 "	280 "
Pigs ..	119 "	119 "

Since so many of the parishes near to the fen-line are partly fen and partly upland, it is hardly possible to give exact figures for these two parts to Cambridgeshire, but with a little

adjustment of the foregoing table we arrive at the following, which can be taken as approximately correct:—

In every 1000 acres there are on			
		Land below 50 feet	Land above 50 feet
Wheat ..	233 acres		172 acres
Barley ..	68 "		99 "
Oats ..	94 "		72 "
Beans ..	24 "		49 "
Potatoes ..	132 "		7 "
Small Fruit ..	25 "		4 "
Cattle ..	120 head		60 head
Horses ..	70 "		30 "
Sheep ..	87 "		415 "

An examination of these statistics enables us to detect the differences between the agriculture in the two parts of the county; and at least partially justifies the statement made in an earlier chapter, that the 50-foot contour, the fen-line, not only separates two areas differing in physical features but also differing in economic values. We must take it for granted that the farmer knows the crops best suited to his lands and grows them accordingly.

While there is more wheat grown in the fenlands, more barley is grown on the uplands. Reference to Fig. 8, p. 34, will remind us of the dry chalk area to the east of Cambridge, more suitable for barley than wheat, while both to the east and west of Cambridge

the boulder clay areas provide good wheat lands, but there is evidently much land in the fens upon which wheat grows well. A table given below shows the comparison for the two areas of various crops in the amounts produced per acre.

The wetter lands of the fens favour oats and potatoes, and the figure for the latter crop substantiates the common knowledge, that the fenlands are famous for potatoes. Small fruits, such as raspberries, strawberries, currants, are fairly widely grown in the fens but are almost absent in the uplands.

In the fruit season it is worth while to travel by a stopping train in the afternoon from King's Lynn to Cambridge and to watch the consignments of fruit loaded into the train at the local stations; or to examine the piled-up barrow-loads on Ely and Cambridge station platforms, addressed to fruiterers in London, the Midlands, or Lancashire.

Horses are much more numerous in the fens, the small farms and wet lands no doubt being the reason, while if figures were available we should probably find that tractors are much commoner on the larger drier fields of the uplands.

The keeping of cattle and sheep

follow exactly what would be expected from the nature of the lands; the wetter meadows of the fens provide excellent grass for cattle, while the drier downs are more suitable for sheep.

Thus we can distinguish between the two areas by saying, the fens are famous for oats, potatoes, fruit, cattle and horses, and the uplands for barley beans, turnips, swedes and sheep.

AVERAGE PRODUCTION FOR THREE YEARS,
1913-15.

	Isle of Ely.	Rest of Cambridgeshire.	Whole of the County	England.
Wheat, in bushels per acre ..	35'55	35'14	35'35	31'67
Barley, in bushels per acre ..	36'20	35'12	35'66	31'60
Oats, in bushels per acre ..	57'42	48'9	53'16	39'59
Potatoes, in tons per acre ..	6'18	6'59	6'38	6'41
Hay from permanent grass in cwts. per acre	22'47	18'3	20'38	21'85

Few comments on this table are required, for it speaks clearly of the richness of Cambridgeshire soils and also perhaps of the ability of Cambridgeshire farmers.

The only figures that will be singled out are those for potatoes. This is a crop that is very dependent on the season, and it may be that the

years to which the figures refer, were not the best for the fenlands. But even for a period of ten years the return per acre for the fens was only just above that for the whole of England.

It often happens that where a crop is grown on a large scale the production per acre is below that for places where it is only grown on a small area. This is the result of various factors in the cultivation, which are beyond our present purpose, except the one factor which may account for the figures under examination. When a crop is grown extensively it is cultivated over a wide area, not only on chosen spots but on good and inferior lands alike, while when it is not widely cultivated it is usually only grown on areas specially suited to it.

With the exception of this figure for potatoes in the fens, and that for hay from permanent grass for southern Cambridgeshire, all the other figures are well above the averages for the whole of England.

Milling.

While the cultivation of the soil is the most important occupation, there are certain industries associated with it, such as milling, brewing, jam-making, that occupy a considerable number of people in the county.

Milling, naturally, is an industry that is scattered over a wide area and not concentrated in special districts. At least this is its nature historically, and it is only in modern times when so much of our wheat is imported that the tendency is for flour mills to be situated near the importing ports. When English bread was made from English wheat, it was natural for flour mills to be built where the wheat was grown. Thus we find that in Cambridgeshire there are about seventy mills distributed throughout the county. Some of them in these days do little grinding of wheat, but are used for crushing oats, while derelict mills are no uncommon sight up and down the county. It is unnecessary to go into all the details which have produced the changes resulting in the presence of these mills in ruins, but it is far more important here, to see that in principle the causes are the same which produced over a century ago the abandonment of the spinning mills up the Pennine valleys in Lancashire, or at the present time, a similar desertion of many cotton mills in the New England States of North America.

The distribution of mills in Cambridgeshire is shown on Fig. 16. The motive power used in these mills

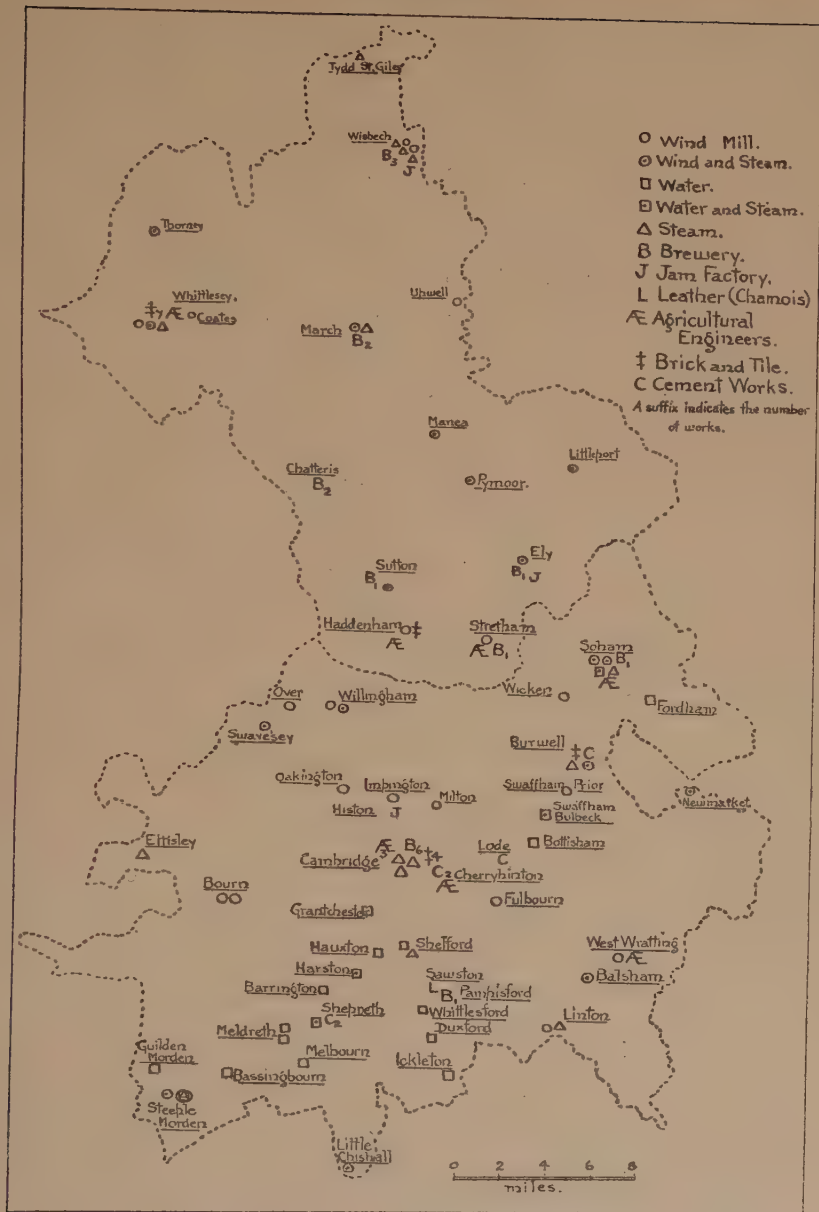


FIG. 16.—THE INDUSTRIES OF CAMBRIDGESHIRE.

Based upon the Ordnance Survey Map with the sanction of the Controller of H.M. Stationery Office.

deserves analysis. Some are wind-mills, some water-mills and some are driven by steam; many have two sources of power, either wind and steam or water and steam, and one has the "three strings to its bow," wind, water and steam.

Wind or water was the power first used, depending upon the locality, but either of these may fail the miller just when it is most required, so with the coming of steam the machinery was adjusted, so that if the cheaper power failed, the mill need not be at a standstill.

Cambridgeshire mills driven by—

wind	..	..	..	..	19
wind or steam	..	..	..	..	17
water	..	..	..	..	14
water or steam	..	..	..	..	4
steam	..	..	..	..	11
wind, water or steam	..	..	..	..	1

From these figures we see that out of the 66 mills, 36 are primarily dependent on wind and 18 on water. By examining the map it will be seen that the water-driven mills are in the valleys of the Cam and Granta, windmills along the fen-line and on the fens, while steam mills are usually in the larger centres or at least near the railways. The two river valleys named above can be traced quite easily to the south of Cambridge by following the location of the water-driven mills,

while in the Isle of Ely there is not a single mill whose power is derived from this source. This again is an expression of the land relief with its slow-flowing rivers, while the presence of windmills in the fens and uplands speaks of the openness of the country and the possibility of using the wind as a source of power.

Brewing.

Brewing like milling is a widely distributed industry based upon barley for the required malt. Many villages and towns throughout England contain a brewery and at least are locally well known for the beers they brew. Advertisements on hoardings and in newspapers often proclaim the quality of the brew. Certain centres like Burton-on-Trent have developed the industry on a large scale owing to the suitability of the local water.

In Cambridgeshire there are eighteen breweries, six of which are in the county town, the remaining twelve, as can be seen on the map, are located at Wisbech (3), March (2), Chatteris (2), and Ely, Sutton, Pampisford, Stretham and Soham, one each. Southern Cambridgeshire, as we have already pointed out, is noted for its barley.

Jam-making.

The village of Histon, Cambridgeshire, is known far and wide as the home of Messrs. Chivers and Sons' jam factory. The well-known firm of Keillers has one at Wisbech, and Ely also has its jam factory. Thus the three factories are situated north of the fen-line in the area where, as the table on p. 70 shows, fruit is more widely grown.

The development of the Histon factory exhibits several points of geographic control. Starting in a small way over fifty years ago, the factory to-day is a large building fitted with all kinds of modern contrivances, and with railway sidings for the bringing in of coal and raw materials required and the sending away of the manufactured articles.

Jam-making is a seasonal occupation, so to keep the machinery in motion and hands employed all the year round, other products must be prepared. Thus we find marmalade, mince-meat, custard and blanc-mange powders, fruit-jellies and coffee essence produced in the same factory.

The factory consumes not only fruit grown in its own orchards, and the surplus from gardens and orchards for miles around, but also fruit imported from the continent. It is

situated on the Midland railway between Cambridge and Huntingdon, and so easily taps the area served by this line, and it is interesting to note that when the Ely factory was started its promoters located it on the railway between Cambridge and King's Lynn.

The Ordnance Survey 1-in. map should be consulted to see how orchards cover large areas in the fen-land, especially in the Histon and Wisbech districts.

In the early spring-time when tree-spraying is in operation, the scene is an uncommon one; from a short distance the trees appear white from top to bottom and look as though they were covered with snow.

Chamois Leather and Parchment.

This is another industry based upon agriculture, in which there are several points of geographic interest to be noted. Chamois leather is made from the sheep skin, but all sheep skins are not equally suitable. Other materials used in the manufacture are water, lime and cod-liver oil, and the nature of the water is a determining factor in the quality of the leather produced.

The skin of the Cambridgeshire sheep, the suitability of the local water and the proximity of chalk for the lime seem to be the causes which led

to the establishment of the industry at the village of Sawston. It is an old industry in the village and dates back some two hundred years or more.

The second point is, that there are only a few such factories in England. There are three in Nottinghamshire and one in each of the counties Worcester, Surrey and Lancashire.

The third point is, that this industry affords a good example of the changes due to foreign competition. Thirty or more years ago the industry was larger than it is to-day, for a considerable foreign market was open to our manufacturers in the United States of America, but since then the American has learnt how to obtain the necessary suitable skins, and to-day Philadelphia has probably the largest chamois leather factory in the world. Thus the number of men now employed in this industry at Sawston is much smaller than what it was previously.

The sheep skin when it enters the factory has already had all the wool removed by the fellmonger. It is then treated with lime-water and split, the outer (grain) side being converted into a soft leather, and the inner (flesh) side into either chamois leather or parchment.

In the chamois leather process the

work is largely mechanical, although care, watchfulness and skill are required, but in the parchment process the work is individual hand labour upon each separate skin. After treatment in lime-water vats each skin is stretched in a separate frame and both surfaces are scraped while wet and when dry. The scrapers clearly indicate the accumulation of experience in their construction. The process affords plenty of examples of how in modern factories nothing is wasted. The outer edge of the skin is cut into the small labels that we see attached to articles in the jeweller's shop, and the scrapings are all carefully collected and boiled down into glue.

The village of Sawston might well be described as an industrial village, for in addition to the occupation already described and the making of chamois-leather gloves, we find other villagers employed in a local printing works, an aerated-water factory and a paper factory. In this about 20 tons of high-grade paper are made weekly, and while years ago it was privately owned, to-day it belongs to one of the largest paper-making companies in the country. Thus by collecting the information and making the necessary explanations in regard to these village industries, it is seen that many

examples of the methods and processes in modern industrialism can be taught in rural areas such as Cambridgeshire.

Although there are no large agricultural implement manufacturers in Cambridgeshire as there are in some of the adjoining counties, there are several firms that specialise in some useful form of machines of their own pattern. The location of these works is given on the map. All raw material has to be brought into the area for this purpose, and so we can understand why these works are not so large as in places nearer to the source of these materials, as Grantham in Lincolnshire, or with a better opportunity for export as Ipswich in Suffolk.

While the previous industries are based on agriculture, there is another series that is based upon the geology of the county. The rocks beneath the soil have been mentioned several times in the previous chapters, and evidently industries based upon the geology must be associated with clay and chalk. First we might mention the making of bricks, tiles and drain-pipes which is carried on in several localities. Whittlesey, a few miles to the east of Peterborough, has seven fields manufacturing these articles, Cambridge five and Haddenham and

Burwell one each. Secondly, the manufacture of cement is important, and is carried on at Cherryhinton on the outskirts of Cambridge, Shepreth, Lode and Burwell, all places situated at the foot of the chalk, from which strata the necessary chalk and clay are obtained required in its manufacture. The hedgerows, trees and houses in the neighbourhood of the cement works are, in a dry season, covered with fine dust that comes from the workings. The tall chimneys, at times belching out smoke, are landmarks for miles around, and remind us of districts in other parts of the country where such sights are common.

Along the edge of the escarpment chalk-pits also occur in many places for the production of lime for mortar.

In the southern part of the fens, as the map on p. 46 shows, the land is composed of peat which in some places is dug for fuel. In some places the peat beds are 18 ft. thick and contain many relics of ancient forests. Digging peat is, however, to-day only a small industry, but it reminds us that Cambridgeshire had its own source of fuel, which was important for local use, in the days before railways brought coal so easily into the district.

Another industry, of considerable importance years ago, was the digging of phosphatic nodules, called coprolites, which when ground form a very valuable manure. Many acres of land in the Cam valley have been dug over for this purpose, and in the latter years of last century many tons were exported every year to the continent. During the Great War the Government undertook this work again, as the phosphoric acid contained in the nodules was required in the manufacture of explosives. A large tract of land to the south of Trumpington was dug with modern machinery, and the region took on a new aspect from what it had previously. But now the soil has been replaced and the fields are again covered with corn as they were before the war.

The printing and bookbinding carried on in Cambridge must not be omitted from the list of Cambridgeshire industries. Books are printed in Cambridge which are sold all over the world, and it seems only natural that such an industry should be located in a university town.

One other industry remains to be mentioned. It is one of the oldest, for we know it has been carried on for thousands of years in Britain, and is very typical of the fen area where

plenty of pliable stems grow naturally on water-willows, alders and other plants. An old Latin author, in describing what we should call a historical pageant, puts into the mouth of one of the actors these words :

“From painted Britain, I, a basket come,
Imported and adopted here at Rome,”

which indicates that the Romans found the industry of basket-making in Britain two thousand years ago, and further that the articles produced must have been well made, for they imported them into Rome. Basketry, although one of the oldest of occupations, is still carried on in the fens, and osier beds are purposely tended to provide the pliable wands required. There are no less than eighteen firms in the northern part of the county engaged in basket-making, and many hands are employed in this industry.

Cambridge is a county that naturally is described as agricultural, but from what has been said in this chapter it is seen that men are occupied in many other ways than by actually working on the land. It is so with all base industries. Many supplementary industries are required either to supply it with necessary raw material and machinery, or to use up its products

as we have seen in this case of agriculture.

This suggests how different occupations are interlocked the one into the other and how depression or prosperity in the main industry affects all the others.

We cannot go far in our study of industrial and commercial geography without recognising the interdependence both of industries and men, and agriculture in Cambridgeshire with its associated industries affords us an example.

CHAPTER IX

DENSITY OF POPULATION—NUMBER OF PEOPLE ENGAGED IN VARIOUS OCCUPATIONS—SUMMARY AND CONCLUSION

IN the preceding chapters we have referred several times to statistics either to supply us with information or to verify results obtained by argument from geographical principles; they can be used for both of these purposes, and by comparison and contrast they enable us to realise the relative importance of different factors in our study. They make our mental pictures more accurate and give a truer perspective of the facts under consideration.

The census reports which are published every ten years provide us with figures that can be used in each of the above ways.

It must be remembered that the geographical county of Cambridgeshire is divided into two parts for administrative purposes, called the Isle of Ely and Cambridgeshire administrative county respectively, each having a separate county council. The boundary is shown on Fig. 16, p. 73.

It has been pointed out in Chap-

ter II that Cambridge is the only town in the southern part of the county, while there are five towns in the Isle of Ely; but Cambridge with its population of 59,000 contains more than one and a half times as many people as these five towns together. All other centres are described as rural districts.

Many references have already been made in earlier chapters to the people who live and work in our county, and the following tables supply us with the necessary particulars to make our ideas definite :—

	Population.	Average number of people per square mile.
England	36,678,000	720
Cambridgeshire (geographical county)	203,419	235
Cambridgeshire (administrative county)	129,602	263
Isle of Ely	73,817	198
Cambridgeshire (A.C. excluding Cambridge) ..	70,338	145
Isle of Ely (ex- cluding the five urban districts)	36,561	128

It is necessary when discussing density of population to have a clear idea of the extent of a square mile. This is not difficult to obtain, particularly if we know four sections of roads each about a mile long and intersecting at right angles. Further, by assuming that on an average four people live in each house we can easily see the distribution over this area of the dwellings required to house the people. Thus when we learn that the density of population of Cambridgeshire is 235, it means that, using the above assumption, only fifty-nine houses are required per square mile; which would mean that each house could have over 10 acres of land attached to it, which, again interpreted, means that Cambridgeshire is a county of farms.

Comparing the density of population of Cambridgeshire with that for the whole of England we obtain the information that it is far below the average. Counties which contain the densely populated areas of the big industrial districts have many more people per square mile than an agricultural county.

We began the first chapter by stating that Cambridgeshire consisted of two parts, and in the subsequent pages we have seen how these two parts differ.

By applying the test afforded by these statistics the same difference is again found, for while the density of population in the southern part of the county is 263, in the Isle of Ely it is only 198. By excluding the urban districts in the two parts of the county, we get a truer picture of the distribution of people in the country from the last two lines in the above table.

The next table, compiled also from the census report, gives us with considerable exactness the number of people who work for their living in different ways out of every thousand who so work. In the Isle of Ely the number of workers is 32,250 and in southern Cambridgeshire 57,155; in each case this is 44 per cent. of the respective populations. The table is incomplete, but sufficient occupations have been included to show in still another way the existing differences

Engaged in	Cambridgeshire (ad. co.) per 1000 workers.	Isle of Ely per 1000 workers.
Agriculture ..	267	493
Domestic service ..	177	96
Transport and communication ..	68	78
Commercial ..	80	70
Professions ..	67	27
Mining and quarrying ..	2	4
Bricks, earthenware ..	2	12
Printing ..	12	7
Other occupations	325	213

between the two administrative parts of the county.

Most of these figures admit of easy explanation, but the following notes are added, the numbers referring to successive lines in the table.

1. These figures perhaps surprise us at first sight owing to the disparity between them. The figure for the Isle of Ely is the largest in England. We have pointed out the differences in the types of agriculture in the two areas, and all these favour more labourers being employed in the northern part of the county. The farms are smaller, more horses and cattle but less sheep are kept, and there is a large fruit culture. For example, there are eight times as many shepherds but only half as many men who look after horses, in the southern part of the county as there are in the Isle of Ely.

2. The second line tells us that there are more people who keep domestic servants in the south than in the north, but this figure includes the relatively large number of men and women engaged in this kind of work in the various colleges in Cambridge.

3. While Cambridge is the only railway junction in the south, in the north there are three, Ely, March and Wisbech, and March is quite an

important railway centre, which explains why the figure is higher in that part of the county.

4. It should be noticed how much less important commerce is than agriculture as measured by the number of workers. The difference between the two areas is not great and is what might be expected.

5. It is natural that southern Cambridgeshire, containing the county town with its university and large population, should have proportionally a larger number of people engaged in the professions—ministers of religion, professors, lawyers, doctors, lecturers, teachers, etc.—than the northern part of the county.

6, 7, 8. The numbers of people engaged in these occupations are conspicuous by their smallness when compared with the lines above, and while the differences which occur between the two parts of the county follow exactly what would be expected the figures emphasise the importance of the county's agriculture and its lack of industries. The Whittlesey area for its clay and bricks and the Cambridge printing trade are, however, noticeable.

Summary and Conclusion.

The method of study which we have applied to the geography of

Cambridgeshire in the preceding chapters has been fundamentally to use the information collected by experts and recorded on maps of various kinds and in departmental documents.

We have then sought to interpret this information intelligently, and to account for various geographical distributions on the surface of the land. Emphasis has frequently been laid on the relationships existing between man and his physical environment, and in the interpretation of what we have found in Cambridgeshire reference has frequently been made to other regions beyond its borders. We have sought to show the application of world-wide principles of geography to what we have found in our neighbourhood.

One reason for adopting this method was an attempt to show that geography, in spite of its many labelled sections, is one and undivided, and that even in such a small area as an English county many opportunities arise for studying the principles upon which geography rests.

"Comparisons are odious," and it may be that some that have been made appear ludicrous because the things compared are palpably so disproportionate in size and influence. The big necessarily makes a stronger

appeal to the imagination of many than the small, but if the small can be observed and understood then the comprehension of the big is more thorough.

It may be that by studying the home area in closer detail, there will be aroused in the minds of some an interest in local things and affairs which, in turn, will produce a better type of citizen. The more people see and understand in their own locality, the more intelligent pride they take in it, then the more valuable will be the part they take in local affairs. They will understand that man's occupation and utilisation of the soil has not been a matter of chance, but that law and order reign in many departments, in which before only confusion appeared. They will better appreciate the benefits conferred upon them by their predecessors, and recognise their obligation to the future.

We have seen in our study of the 864 sq. miles of land surface which forms the geographical county of Cambridgeshire that there is sufficient variety of structure and relief to give rise to an important difference in other geographical features. The contrasts between the northern and southern parts of the county exist not only in

the nature of the relief, soils, rivers and drainage, but can be seen in the human occupations and centres. The northern part of the county in its natural state was a barrier and a desert, but by the continued application of thought and energy it has been converted into a rich fruitful area, that has repaid many times over the expense occurred in controlling the adverse forces of nature—an example of man's conquest of nature.

We have seen that there are at work on a small scale the same forces pro-

ducing the same results as in other places, where, working on a larger scale, the results are more evident. The distribution of men and of animals, of villages and of towns, of farms and of products is the result of controlling forces that are ever at work in the world of nature.

Thus a small area contains examples of geographical facts—physical, political, commercial, industrial, human—the comprehension of which is all important in the study of modern geography.

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